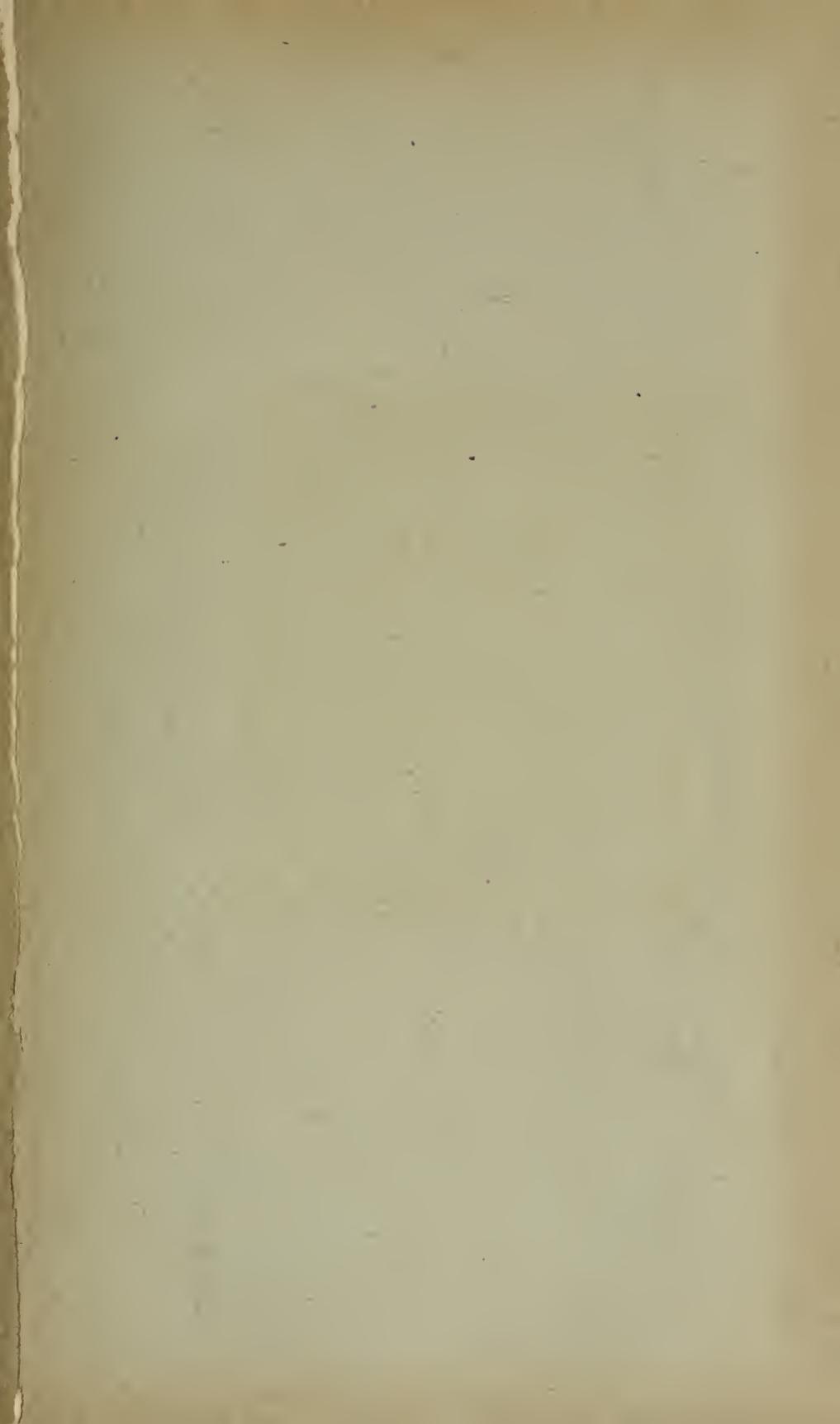


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THE VICTORIAN NATURALIST.

VOL. XXXI., 1914-15.

THE
VICTORIAN NATURALIST:
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OF THE
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MAY, 1914, TO APRIL, 1915.

Hon. Editor: MR. F. G. A. BARNARD.

The Author of each Article is responsible for the facts and opinions recorded.

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THE VICTORIAN NATURALIST.

VOL. XXXI.

MAY, 1914, to APRIL, 1915.

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ERRATA.

Page 103, lines 23, 24—For "specimens" read "specimen."
Line 25—For "COTYPE" read "COTYPES."

Page 124, line 19 from bottom—For "Macrocyprus" read "Macrocypris."

Page 135, line 4 from bottom—For "Urodeba" read "Uro dela."

Page 136, line 8—For "spermatozea" read "spermatozoa."

Page 140, line 17—Insert "and" before "with close."

Line 19—For "equalis" read "æqualis."

The Victorian Naturalist.

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MAY 7, 1914.

No. 365.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 20th April, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 50 members and visitors were present.

CORRESPONDENCE.

From Professor Spencer, thanking the Club for its congratulations on the conferring upon him of the degree of Doctor of Science.

From the secretary of the Girls' Realm Guild of Service and Good Fellowship, Sydney, stating that the society intends to hold its second Australian wild-flower show in September next, and inviting the Club to take part in the exhibition. On the motion of Mr. G. Coghill, second by Dr. C. S. Sutton, it was decided to refer the letter to the committee for consideration.

From Mr. Cornthwaite, Thorpdale, South Gippsland, with reference to the destruction of native birds by poison laid for rabbits, and desiring the Club to take the matter up.

Mr. C. L. Barrett said that he would like the Club to take some action in the matter.

Mr. O. Rosenhain said that when the department was approached on a previous occasion it asked for definite evidence of the destruction. If the writer could send down some of the dead birds so that they might be analyzed, the Club might have something definite to go upon.

Mr. A. D. Hardy said that the department wanted evidence and not mere statements. Detailed reports from many rabbit inspectors were furnished to Mr. F. Allan, the chief inspector, which disproved the statements made of the destruction of native birds by poison laid for rabbits.

The president said he had been in the district referred to by the writer, but did not notice any great destruction of birds. He would, however, like something definite to be done.

Mr. J. Gabriel moved that the writer be asked to forward a dozen or so of the dead birds, of various species, to the Veterinary College for examination.

Mr. Rosenhain seconded the motion, which was carried.

REPORTS.

A report of the excursion to the State Nursery at Macedon, on Saturday, 14th March, was given by the leader, Mr. A. D.

Hardy, F.L.S., who said that only four members availed themselves of the opportunity of visiting the nursery, which was found to contain a most interesting collection of exotic trees, &c., all splendidly grown. The forenoon passed all too quickly in inspecting the general collection and the methods of raising trees for distribution to State departments, &c. In the afternoon a visit was made to Messrs. Taylor and Sangster's nursery, at Upper Macedon, where a specialty is made of trees and shrubs, &c., suitable for higher elevations.

A report of the excursion to Sugarloaf Hill, Mont Park, on Saturday, 28th March, was given by the leader, Mr. F. Chapman, A.L.S., who said that, perhaps owing to threatening weather, the attendance was small. However, the afternoon turned out very fine, and, in addition to inspecting the interesting felsitic dyke which is exposed on the hill, the party had a very fine view of the physiography of the surrounding country.

A report of the excursion to Eltham on Saturday, 4th April, was given by the leader, Mr. P. R. H. St. John, who said that the party crossed Diamond Creek and proceeded in a northerly direction. A very enjoyable and profitable afternoon was spent among the eucalypts.

A report of the Easter excursion to Phillip Island. Thursday, 9th, to Tuesday, 14th April, was given by the leader, Mr. E. C. Joshua, who said that twelve members participated, and though the excursion was somewhat marred by the inclemency of the weather, nevertheless they got a fair amount of enjoyment out of the trip. The rough, squally weather made dredging operations, for which the excursion had been arranged, impossible. On Easter Monday evening (13th April) they had a magnificent view of that unusual phenomenon a lunar rainbow.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. Robert Stephenson Sherlock, Wolseley-grove, Brighton Beach, and Mr. T. E. Turner, Burwood-road, Auburn, were duly elected ordinary members, and Mr. Frank S. Smith, Norat, as a country member of the Club.

GENERAL BUSINESS.

The president said that Mr. F. G. A. Barnard had presented to the Club a mounted copy of Broadbent's map, "Fifty Miles Round Melbourne," which would be of great service to members at the monthly meetings.

PAPER READ.

By Mr. Reginald Kelly, entitled "Plant Distribution in the Healesville District."

The author considered that the site of Healesville had once been covered by an extensive lake. He traced the occurrence of many of the larger forms of vegetation through the different parts of the district, some species occurring in quite isolated positions, while others seemed to be influenced by the direction of the minor ranges.

Dr. Sutton said the paper was most interesting, and could not have been written except as the result of many years' observations. He desired to know if there was any marked difference between the vegetation growing on the Silurian and on the Volcanic.

Mr. Hardy said he desired to add his tribute of appreciation. He considered that the Field Naturalists' Club had done good work in mapping out the floras of various districts in Victoria.

Mr. F. G. A. Barnard also congratulated the author on his paper, which showed a good acquaintance with the district.

The author, in reply, said that in the Healesville district there was no marked difference in the vegetation on the two geological formations.

NATURAL HISTORY NOTES.

Mr. C. J. Gabriel referred to his exhibit of mollusca from Portsea. During a recent holiday he was spending at Portsea the jetty happened to be under repair, a number of the piles being withdrawn and replaced by new ones. The old piles were found to be teeming with marine life, and many crustaceans, isopods, bryozoa, mollusca, and those numerous creatures which are so frequently relegated to the scientific rubbish-heap—the worms—were collected, and have been handed over to specialists for examination. The mollusca were particularly interesting and numerous. Three of our rarest chitons, *Acanthochites maughani*, Torr and Ashby, *A. speciosus*, Adams, and *A. kimberi*, Torr, may be mentioned. The Victorian cowries were well represented, but as the contractor and his men were equally keen in the search for them, they were difficult to obtain. All of the piles showed the destructive work of the ship-worms; one burrow, having a diameter of an inch, measured two feet in length, and the animal is exhibited on the table to-night.

Mr. J. Booth forwarded a note stating that recently, when driving between Omeo and Glen Wills he noticed a "procession" of caterpillars crossing the road. It was injured by a wheel of the vehicle crushing some of them. The procession only recommenced to progress when the hindmost caterpillars, which had been cut off, were placed in contact with the foremost ones. Moving the leader to the hindmost position also stopped progress, and the "procession" made no attempt to move until the leader was replaced, when movement was resumed.

EXHIBITS.

By Mr. F. G. A. Barnard.—Section of kelp 18 inches in width, marine algæ, sponges, &c., from Cat Bay, Phillip Island; Older Basalt, from Point Grant, Phillip Island.

By Mr. J. Booth.—A caterpillar, in illustration of his natural history note.

By Mr. C. J. Gabriel.—Marine shells from the Portsea jetty, including rare chitons, *Acanthochites maughani*, Torr and Ashby, *A. speciosus*, Adams, and *A. kimberi*, Torr.

By Mr. J. Gabriel.—Eggs of Mutton-birds and other Petrels.

By Mr. J. Searle.—Fresh-water crustacean, *Anaspides tasmanica*, from Mt. Wellington, Tasmania.

By Mr. J. Stickland.—Larva of the water-beetle, *Dytiscus*, almost covered with masses of protozoa, probably of the genus *Epistylis*, together with a considerable growth of algæ. These specimens grew upon the larva while it was alive. From Alexandra-avenue, Melbourne.

By Mr. P. R. H. St. John.—Herbarium specimens of *Eucalyptus nitens*, Maiden, collected by Dr. Heber Green at the head of the Acheron valley, 11th April, 1914.

After the usual conversazione the meeting terminated.

EXCURSION TO BEAUMARIS.

WITH a Melbourne temperature of 97°, a small party of Field Naturalists, together with representatives from the Microscopical Society of Victoria, left Flinders-street at 2 p.m. on Saturday, 14th February. On arriving at Sandringham the party was found to have increased to twenty, and this, considering the unusually trying weather circumstances, speaks well of the interest shown in the objects of the excursion, which were two-fold. We seem, however, not yet to have profited by previous experience in obtaining information as to suitability of tides when drawing up the excursion programme, for when, after the usual eighteenth century jog-trot journey, Beaumaris was reached, the tide was full high. Not being provided with water-boots, water-telescopes, or even biplanes, we were debarred from studying marine life to any extent, and so faced our alternative subject—fossils. During the afternoon, however, many common but nevertheless interesting objects were picked up at the highest tide limit, amongst which were the screw-like egg-cases of the "Gummy" or Port Jackson shark, *Cestracion*, and a jaw of the Porcupine-fish, *Diodon*, the latter serving as a peg on which to hang some remarks on perhaps one of the most interesting finds of the afternoon—namely, a fossil palatal tooth of the same fish-genus,

and named *Diodon formosus*. A tooth of a fossil shark, belonging to the living genus *Odontaspis*, or "Grey Nurse," was also found in the shingle. Amongst the common muddy and rocky shore species of shell-fish the following were noticed : —*Risella melanostoma*, *Monodonta (Anstrocochlea) constricta*, *Astralium aureum*, *Cominella lineolata*, *Bittium cerithium*, *Vermetus novæ-hollandiæ*, *Tellina deltoidalis*, *T. decussata*, *Venerupis crenata*, and *Venus strigosa*. Several specimens of the beautiful reef-forming coral, *Plesiastræa urvillei*, were picked up during the search amongst the shingle. At the high cliff-section near the baths some remarks were given in explanation of what was to be seen in the successive bands of the rocks in this series, as well as on the concretionary layers of calcareous and ferruginous natures. The basal remanié bed with fish remains, the yellow marls with *Trigonia* and *Limopsis*, and the upper beds with bands of ironstone, in places full of casts of small gasteropods and larger bivalves, were briefly noted. One lady member of the party was so fortunate as to crack open a very rich block of this last-named material containing casts of *Mactra howchiniana*, *Dosinea*, *Zenaliopsis*, and many other genera. Although no collecting of microscopic shore-life was possible, owing to the tide, the interest of our microscopical members was retained by the examination of a sample of the *Trigonia* bed of this Kalimnan cliff ; first washing the material through a sieve and then spreading the residue on a slide under a microscope which had been brought along for the purpose. Amongst the minute objects washed out of this marl were examples of the millet-seed-like *Miliolina* and the beautiful nautilus-like *Polystomella crispa* ; whilst numerous delicately-sculptured spines of a fossil spatangoid sea-urchin were noticed in the washings. These latter probably belong to the common *Lovenia forbesi*, numerous tests of which were picked up from fallen blocks and from amongst the shingle during the afternoon. The botanical side of our outing was well looked after by Mr. F. Pitcher, who pointed out several interesting plants growing on this part of the coast-line, amongst which was the brightly-coloured, fresh green foliage of the clumps of Boobialla, *Myoporum insulare*, making a pleasing contrast on such a warm and dusty afternoon with the dull foliage of the Coast Tea-tree, *Leptospermum lœvigatum*. —F. CHAPMAN.

EXCURSION TO MONT PARK, BUNDOORA.

ONLY two members of the Club and the leader joined in this excursion on Saturday, 28th March. The afternoon was fine and cool, and the air bracing and thoroughly enjoyable. The

uncertainty of the weather in the morning probably accounts for the paucity of attendance. Alighting at Macleod station, on the Eltham line, we made our way up the hill through the belt of Golden Wattles to the top, where a reservoir supplying the adjacent asylum is situated. The object of the excursion was to see the unique dyke cutting through the hill, and to gain an idea of the physiography of the surrounding country. Sugarloaf Hill, as it is known, is a splendid view-point, and is about four miles north of Heidelberg. It is 440 feet above sea-level, and is an outstanding monadnock or residual hill left by the erosive action on the surrounding country by the river system, on account of the comparative hardness of the rock. In all probability this hardness is due to the induration of the sandy shales of the Silurian bed-rock (Melbournian) by the intrusion of the felsitic dyke, and, indeed, fragments of very hard country rock are seen lying about, mixed with pieces of the dyke rock, scattered over the hill, and especially near the excavations made for the reservoir on the summit. The nature of the dyke and the general trend across the hill was noticed. In structure this dyke is a fine-grained felsite, and has burst through the bed-rock across the line of strike. What seems to have subsequently taken place is the reopening on one side of the dyke, resulting in a mass of fragments torn from the dyke and its brecciated face, including as well sandstone, shale, and milky quartz from the bed-rock itself. Lastly, after a period of rest, another fault-line was developed midway, and the sides of the fissure shaken horizontally, which resulted in giving a "slickensided" or striated enamel face to the adjacent rocks. Specimens of the interesting kinds of rocks were secured, including some nicely jointed masses of sandy clay, in which the structure had probably been produced by the heated intrusive rock forming the dyke. The freshness of the dyke, and the complicated structures shown to be associated with it, make this occurrence one of unique interest. One of our members had provided himself with field-glasses, and by its help we were enabled to pick out many distant places of interest along the Plenty Ranges, as well as the distant monadnocks of Kangaroo Ground, and Pine Mont, at Ringwood. The recent removal of the Doncaster Tower was felt to be a decided loss, as it was so useful as a landmark in examining the surrounding country. Finding it would be a rather long wait for the next train at Macleod, we turned our faces to Heidelberg, and caught the 5.30 train to town, well satisfied with the healthy and enjoyable afternoon's outing, the only regret being that there were so few members participating in it.—F. CHAPMAN.

EXCURSION TO PHILLIP ISLAND.

THE Easter excursion to Phillip Island, 10th to 14th April, 1914, was somewhat marred by the inclemency of the weather, nevertheless the dozen members who participated in the trip managed to get a fair amount of enjoyment out of the outing. The rough, squally weather made dredging operations impossible; we were therefore thrown back upon collecting along the shore, bark-stripping for insects, and making excursions to such localities as Cape Woolamai and M'Haffie's Reef. The rough weather was rather an advantage in viewing these latter places, emphasizing as it did the rugged grandeur of the rocky coast. This was not all that we had to thank the bad weather for, as on the evening of Easter Monday (13th April) we had a magnificent view of that unusual phenomenon a lunar rainbow.

So far as practical results are concerned, I am not in a position to give specific names to many of the marine animals collected. I noted, however, that of the material cast up upon the beaches sponges and tunicates were very much in evidence, and several species of Hydrozoa and Polyzoa were abundant. Amongst the sponges is to be included a species which I believe to be close to if not identical with *Euspongia officinalis*, a valuable commercial variety. The tunicates comprised a very large number of species, and Phillip Island after a storm should be noted as a prolific collecting ground by anyone intending to work this group. At M'Haffie's Reef we noticed at extreme low water mark what we thought at first to be a stationary flock of birds. On coming up to them, however, they proved to be numbers of a large species of growing tunicate. The individuals were about a foot in height; there were some hundreds of these, and the spectacle was peculiar. Another curious ascidian was picked up—viz., *Collella pedunculata*, Quoy and Gaimard. The *Challenger* specimens of this species were collected at Kerguelen Island and at stations in the neighbourhood of 50° S. Only one holothurian was found—viz., *Colochirus doliolum*, Pallas. I am indebted to Messrs. Wilson, Spry, and Barnard for notes and lists in connection with the ornithology, entomology, and botany of the outing. A number of spiders were collected, including a specimen of that extraordinary form *Salena excavata*; the others are at present unidentified. Mr. Wilson reports seeing a Koala or Native Bear between Cowes and Pyramid Rock.

ORNITHOLOGY.—Mr. H. W. Wilson writes:—“ Fifty species of birds, with two introduced species, the House Sparrow and the Starling, were identified by Mr. L. G. Chandler, of the Bird Observers' Club, and myself during the five days' outing at Phillip Island. The species are arranged and numbered as in Dr. Leach's ‘Australian Bird Book.’

17. Brush Bronzewing Pigeon, *Phaps elegans* (two pairs).
33. Little Penguin, *Eudyptula minor*.
34. Fairy Penguin, *E. undina*.
42. Short-tailed Petrel, Mutton-bird, *Puffinus brevicaudus* (*tenuirostris*).
67. Crested Tern, *Sterna bergii*.
72. Silver Gull, *Larus novæ-hollandiæ*.
73. Pacific Gull, *Gabianus pacificus*.
75. Richardson Skua, *Stercorarius crepidatus*.
80. Spurwing Plover, *Lobivanellus lobatus*.
81. Black-breasted Plover, *Zonifer tricolor*.
86. Red-capped Dottrel, *Ægialitis ruficapilla*.
102. Sharp-tailed Sandpiper, *Heteropygia aurita*.
119. White-fronted Heron, *Notophoyx novæ-hollandiæ*.
141. Musk Duck, *Biziura lobata*.
143. Little Black Cormorant, *Phalacrocorax carbo*.
144. White-breasted Cormorant, *P. gouldi*.
148. Australian Gannet, *Sula serrator*.
152. Allied Harrier, *Circus gouldi*.
170. Little Falcon, *Falco lunulatus*.
172. Brown Hawk, *Hieracidea orientalis*.
173. Nankeen Kestrel, *Cerchneis cenchroides*.
187. Little Lorikeet, *Glossopsittacus pusillus*.
202. Rosella, *Platycercus eximius*.
220. Blue Kingfisher, *Aleyone azurca*.
221. Laughing Kingfisher, *Dacelo gigas*.
228. White-rumped Swift, *Cypselus pacificus*.
238. Welcome Swallow, *Chelidon neoxena*.
242. Australian Brown Flycatcher, *Micræca fascinans*.
245. Flame-breasted Robin, *Petroica phœnicœa*.
246. Pink-breasted Robin, *P. rhodinogaster*.
254. White-shafted Fantail, *Rhipidura albiscapa*.
256. Black and White Fantail, *R. motacilloides*.
281. White-fronted Chat, *Ephthianura albifrons*.
285. Golden-headed Fantail-Warbler, *Cisticola exilis*.
289. Brown Tit-Warbler, *Acanthiza pusilla*.
291. Striated Tit-Warbler, *A. lineata*.
293. Yellow-tailed Tit-Warbler, *A. chrysorrhoa*.
297. White-browed Scrub-Wren, *Sericornis frontalis*.
300. Superb Warbler, *Malurus cyanochlamys*.
313. Wood-Swallow, *Artamus tenebrosus*.
314. Magpie-Lark, *Grallina picata*.
315. Grey Shrike-Thrush, *Colluricincla harmonica*.
317. White-backed Magpie, *Gymnorhina leuconota*.
319. Australian Butcher-bird, *Cracticus destructor*.
323. Rufous-breasted Whistler, *Pachycephala pectoralis* (uncertain).

334. White-eye, *Zosterops cærulescens*.
370. Wattle-bird, *Acanthochæra carunculata*.
371. Brush Wattle-bird, *Anellobia chrysoptera*.
376. Australian Pipit, *Anthus australis*.
394. Grey Bell-Magpie, *Strepera versicolor*."

ENTOMOLOGY.—The following species have been identified by Mr. F. Spry, of the National Museum, among the specimens collected at Phillip Island :—

Orthoptera: Dermaptera, *Nesogaster ruficeps*, Er. (young form), Blattidae, *Onicosoma granicollis*, Sauss.

Neuroptera: *Osmylus strigatus*, Burm.

Coleoptera: *Scaraphites rotundipennis*, Dej.; *Sarothrocrepis corticallis*, Fab. (2 specimens); *Lacon caliginosus*, Cand.; *Copidita punctum*, Macl. (3 specimens); *Promethis angulatus*, Er.; *Chalcopterus variabilis*, Bless. (2 specimens); *Prypnus canaliculatus*, Gyll.; *Paropsis polyglypta*, Germ.

Hymenoptera: *Myrmecia forficulata*, Fab.; *Camponotus claripes*, Mayr.; *Thynnoides gracilis*, Westw.

Hemiptera: *Pirates* (? sp.) (immature); *Notus depressus*, Dall.; *Ptilocnemus lemur*.

Homoptera: Fam. Coccidæ, sub-fam. Monophlebiinæ, *Monophlebus crawfordi*, Mask.

BOTANY.—Mr. F. G. A. Barnard writes:—"The report of the excursion to Phillip Island at Easter of last year (*Vict. Nat.*, xxx., p. 29) contained no mention of the trees or plants met with, and seemingly for a very good reason, for in the limited opportunities I had of investigating the flora during the recent excursion, nothing of particular interest was noted. Certainly Easter is not the time of year to see many of our flowering trees or plants at their best, and the present year has so far been exceptionally dry on the island. Perhaps the most noticeable vegetation seen by the visitor on first landing are the fine Banksias, which, along with the Coast Tea-trees, form a splendid breakwind along the northern shore. The former trees were in full bloom, their singular spikes of flowers being in various stages, and the honey contained therein affording a great attraction to many honey-loving birds. Several trees were noticed with stems fully 30 inches in diameter. The road from Cowes to the ocean beach divides the island into two fairly equal parts. The western half, with the exception of the racecourse paddock, is, except the coastal belt, almost devoid of native vegetation of any size, having been cleared many years ago to make room for the chicory farms, which at one time formed the principal industry of the island. However, in parts the swamp paper-bark is encroaching rapidly on the one time cultivated paddocks. In the eastern half of the

island there are many small patches of native timber, &c., still left. The prevailing eucalypt seems to be the Narrowed-leaved Peppermint, *E. amygdalina*, of only moderate size. Here and there the Yellow Box-gum, *E. melliodora*, occurs, and just about the centre of the island a limited number of Blue Gums, *E. globulus*, of various ages, may be seen. During a visit to Pyramid Rock we found quantities of *Acacia verticillata*, but very stunted in growth; *Goodenia ovata* occurred there also, but a stouter form than usually met with. The common heath (*Epacris*) seemed scarce, and where the orchids are found, which many years ago formed such a feature at our wild-flower exhibitions, seemed to me a puzzle; but then, of course, it was too early even for their foliage to betray their presence. I was told that sheokes once covered large portions of the western side of the island, but the only specimens we saw were in the corner of a paddock near Rhyll. The only shrub in bloom on the Woolamai Peninsula was a composite, *Olearia (Aster) axillaris*, which has a very aromatic odour. Here the Coast White-bush, *Calocephalus Brownii*, formed large cushion-like masses. The Mutton-birds have had additional cover provided for them by the planting of marram grass, which is doing exceedingly well along the sand-ridges. Of neither the tussock grass nor the cladium, among which most of the burrows are situated, was I able to get flowering specimens, so cannot identify the species. The sweet Bursaria was in many places in a picturesque stage, its purse-like seed-vessels being of a rich sienna colour, and quickly attracting notice. Along the ocean coast-line, opposed to strong winds, the vegetation is, as might be expected, very scanty. It was sad to see how the European gorse or furze is taking possession of the roadsides, and, along with the sweet-briar, it will soon become a formidable pest to the land-owners."

The party regretted that, owing to unforeseen circumstances, Mr. J. Gabriel, whose name appeared in the excursion list as co-leader, was unable to take part in the outing, more especially as he is so thoroughly acquainted with all parts of the island and its surroundings.—E. C. JOSHUA.

FLOWERS IN THE SNOW.—The *Country-Side* (London) for April has a short illustrated article on the Alpine Soldanella, a composite plant which thrusts its flowers up through the snow of the Swiss snowfields during the early spring. If the snow is not too thick the flowers are very numerous, and appear like violet daisies stuck into the snow. The plant has thick evergreen leaves, and the respiration from the flower buds produces sufficient heat to melt the snow surrounding the flower-stalk, thus enabling it to reach the light and air.

NOTES ON THE VICTORIAN LYRE-BIRD, *MENURA VICTORIE*, GLD.

By J. G. O'DONOGHUE.

(Read before the Field Naturalists' Club of Victoria, 9th March, 1914.)

THE colonization of Victoria, in common with the other territorial divisions of the Commonwealth, has been fraught with far-reaching and serious consequences to its fauna and flora. Wherever the white man established a settlement he at once began to effect radical changes in his surroundings and to gather about him, either from essential or sentimental motives, the animals and vegetation common to the country whence he came. By drainage and tillage, and by extensive clearing and ring-barking, numbers of indigenous plants and trees were destroyed, the source of sustenance and of shelter of an equally large and varied number of indigenous insects and animals. In the struggle for existence that of necessity ensued, by reason of the restriction of their area of active operations, those of either class that survived were later brought into competition with the alien plants and animals he directly or indirectly introduced, with unfavourable results.

Possibly the practical annihilation of many of our fauna is in a great measure due more directly to man than to the animals he naturalized. Directly, he is responsible for the rapid disappearance of the Bustard and Wedge-tailed Eagle by means of poison he largely uses to suppress, in some measure, the rabbit, which, here freed from the restrictions imposed upon its increase by those predaceous animals with which it was associated in the Old World, multiplies to such an extent as to become a menace to successful farming and grazing. Indirectly, he is responsible for the sad havoc now being wrought amongst our indigenous birds by the fox he introduced to chase, red-coated and horsed, across country with a pack of hounds.

One, the Lyre-bird, the subject of this paper, will soon be, principally owing to this scourge, a thing of the past. Already authentic information records its total disappearance from some favourable localities and its rapidly decreasing numbers in others. It behoves us, then, when afforded opportunities, to study the habits and peculiarities of this unique bird whilst its epitaph remains unwritten.

The following brief notes are contributed to that end. They merely constitute, in part, what came under my daily notice during a residence of twelve months, or thereabouts, in the Crooked River district, North Gippsland, where the birds were as numerous as sparrows or starlings in the suburbs of Melbourne, and deal with some of the contentious points that

engaged the attention of bird-observers some time ago in "Nature Notes," edited by Donald Macdonald, in the *Argus*. In many cases the views and conclusions embodied in the article may be erroneous, though based on observed facts. If, however, they serve to stimulate closer observation of the habits of the bird under review, and such investigation leads up to the discovery of one or more interesting facts respecting it that may have hitherto escaped notice, the purpose of the paper and the aims of the Club will be alike achieved.

The shyness of the Lyre-bird has now become as proverbial as the cunning of the fox, and one is at times entertained by the efforts of some well-meaning individual to advance a reasonable supposition for the acquirement by the bird of this trait, in surroundings wild in the extreme, but devoid to all intents of any predatory animal whose attacks it might apprehend. Favouring as it does the almost inaccessible fern-gullies of the heavily-timbered ranges of Gippsland, the bird is more often heard than seen, and possibly from this circumstance it has been credited with the possession of a faculty which is neither essential for its protection nor necessary for the procurement of its means of subsistence.

The bird, so far as my observations are concerned, is not so excessively shy as is generally supposed. In common with most wild creatures, it is possessed of an instinctive dread of man, but not to such an extent as to warrant the contention that to effect its destruction the sportsman must leave his watch behind during his mission and endeavour to still the beating of his heart, lest the ticking of the former and the throbbing of the latter reach the acute-eared bird. In North Gippsland, when desirous of stalking a cock bird, I found that, by imitating the call of the Wonga Pigeon, I had absolutely no difficulty in approaching within fatal range without the exercise of any great degree of caution.

I can never recall without feelings of amusement the many encounters I had with a pair of Lyre-birds on the eastern slope of a small valley between two narrow spurs that extended in a more or less southerly direction from a main axis of elevation. On the margin of a diminutive glade, amid a dense investment of vegetation in which the Blanketwood, *Senecio Bedfordi*, predominated, the female had constructed her nest in a hollow stump about six feet from the ground. From her coign of vantage she commanded an excellent view of the crest of the tip of an old inclining shaft and of the dancing mound whereon her partner exercised his powers of mimicry and complicated movement, and postured and flaunted his tail feathers for her edification as well as for his own delectation. The shaft had been sunk with the dip of the Silurian strata on what had

evidently been a strong make of quartz. Over thirty years had elapsed since the mine had been abandoned, so that Nature had had ample time to repair the ravages wrought by man in its immediate neighbourhood. The only evidence of his handiwork was the gaping hole and dump on the hillside and a few bleached and decaying stumps and logs that still bore the marks of his ruthless axe.

It was the varied series of calls, arising from this spot, that attracted my attention one morning, and induced me to quit a small track along which I was journeying, and to venture with excessive caution amid the undergrowth in expectation of beholding the ornithological marvel of mimicry. Stealthy though my approach had been, my appearance on the crest of the tip was immediately noted by the female, who emitted a shrill, tremulous note, quitted her nest, and glided into the mazes of the surrounding vegetation. The male bird promptly vacated the dancing mound at the alarm signal, but proceeded only a few yards when his panic gave place to curiosity. Pausing, he glanced keenly around, and at once detected my presence. For the space of a minute neither moved a muscle. I regarded the bird with mingled feelings of amusement and speculation, whilst curiosity and suspicion were admirably portrayed in its mien. Sinking cautiously to a recumbent position, I maintained my scrutiny till it became irksome, whereupon I flicked a piece of clay slate towards the bird. The action, contrary to my expectation, was received with manifestations of delight instead of fear. The piece of slate was crooned over, pecked, scratched, and jumped upon as if it were a grub or worm that required a little massage to render it palatable. This proved but a prelude to a much better acquaintance, for, from the tip, I subsequently very often viewed the bird's antics on the dancing mound and pelted him with pieces of quartz and Silurian rock till my arm ached. During the fusillade the bird would be tripping about the mound with the tail slightly expanded and but slightly elevated, uttering the while a low, tremulous note, and evidencing, apparently, an utter contempt for my marksmanship. The manner in which it timed the flight, and the comparative ease with which it avoided the missiles, proved conclusively that, despite its assumed carelessness, it watched every movement I made with the minutest attention. A temporary retirement from the scene of hostilities occasionally took place when several missiles, directed with more than ordinary accuracy and in rapid succession, disarranged the bird's tail feathers, but the mound was not abandoned till my near approach rendered such a course necessary. The bird undoubtedly enjoyed these encounters, and with assumed curiosity would examine the

piece of quartz or clay-slate that came hurtling into the mound, and favour it with several tentative pecks. The moment, however, I quitted the tip and advanced towards the mound the bird would give utterance to several shrill, tremulous cries and glide on expanded wings over the Blanket-wood to some secluded spot near the margin of the stream in the valley beneath. After the lapse of a short interval it would re-appear on the outskirts of the scrub, and, if I was not a conspicuous object in the landscape, resume its antics. The female invariably delayed her departure from the nest till I was at the dancing mound; then she would spring off her egg and, with partially open wings, run or hop to the nearest covert, where, exposing herself at intervals, she would create as much disturbance as a dozen of hungry farm-yard ducks. The moment I withdrew she resumed her place on the nest, and from beneath her over-arching tail feathers watched carefully for my reappearance.

The cock bird adopts various attitudes when engaged imitating the calls of other birds and when pirouetting on the dancing mound. One of the principal stock-in-trade postures I noted was that of holding the tail expanded at an elevation of 45 degrees with the back, the head being low and the wings partially open and drooping. Thus conditioned, the bird, with rigid legs and toes, would spring forward as if on some object on the dancing mound, and on alighting emit a short, shrill note that sounded like "Chick." The retrogressive movement was equally as sudden. These two evolutions would be persisted in till their repetition and the shrill sound accompanying the progressive action became wearisome to the spectator. It has been stated by many that the hen birds witness the performances by the male. Possibly they do. In no instance, however, have I detected females in the vicinity of a mound in use. Were they in the neighbourhood their presence could not very well be overlooked, since, whatever failings may be charged against them, they cannot be accused of the possession of a retiring disposition, or of inherent muteness.

My observations lead me to assume that every cock bird has a regular beat, which he usually traverses in the early part of the day and towards sunset. I have often sat and noted the progress of a particular bird doing the round of its whistling beds, or dancing mounds, and have frequently taken up a position on a bed and stealthily awaited the bird's approach; but, though exercising the greatest caution in my movements, no bird ever blundered into the circumscribed area over which I maintained vigil.

Many years previous to my visit to the locality under review

I had been assured by a trapper whom I met in the Jeeralang district, South Gippsland, that he could encompass the destruction of a greater number of male birds in one day with the aid of "springers" than a sportsman could in a week with a good dog and a gun. Having had, on more than one occasion, ocular demonstration of the destruction wrought among the "pheasants," as the Lyre-birds are popularly termed in Gippsland, by a keen sportsman behind a good working dog, I had my doubts, and when an opportunity presented itself I repeatedly tried the device, but, whether by reason of my lack of skill, or the possession by the birds of a greater degree of cunning than their Jeeralang compatriots, the only result attendant on my efforts was a tail feather. The birds invariably scratched the forked pegs out of the ground, and on one occasion the slender sapling that constituted the "springer." Surveyors' assistants have informed me that in some parts of South Gippsland the only way they could prevent the Lyre-birds scratching up the survey pegs and obliterating the trenches was to weight the former with heavy logs and to cover the latter with brushwood.

The beds or mounds constructed by the cock bird for whistling and dancing upon are usually ranged some distance up the slope of the hillside, or along the crest of a spur. They are more or less circular in outline, and of various sizes, the general run of them coming under my observation being from two to three feet in diameter. They are invariably selvedged by vegetation, and are composed of vegetable loam collected by the bird with its powerful claws. Those in daily use are kept well stirred, but whether by the bird in an occasional quest of insect larvæ, or by its claws when dancing, I have been unable to determine. The disused beds soon become covered with weeds, and in many cases several of these may be noted in the immediate vicinity of one in daily use. This circumstance would seem to warrant the assumption that the bird passes the greater part of its existence in a circumscribed area.

The association of the Lyre-bird with the settlers' broods, both in a state of captivity and in its feral state, has often been chronicled, but, so far as my knowledge extends, I can only recall one instance of interbreeding being made public. Some eighteen years ago the well-known ornithologist, Mr. A. W. Milligan, then resident at Traralgon, had in captivity several hybrids, a cross between the male Lyre-bird and the domestic fowl. These unique birds, when exhibited at a Melbourne dog and poultry show, occasioned much interest, and were awarded a special prize. They were fowl-like in form, but built on a somewhat smaller scale. The plumage was lax and indeter-

minate, and ashy-brown in colour. The wing feathers, protruding in sheaths like a camel-hair paint brush, closely resembled hair in texture, but in any other respects, except the voice, they approximated more to the characteristic features of the domestic than to the wild stock.

Mr. Milligan began a series of experiments with these hybrids, which bred freely *inter se*, and had successfully reared two generations when he broke up his home and proceeded to Western Australia. At this time the experiments of the Austrian monk, Gregor Mendel, and the statement of the law he had deduced from his results and published in 1865, was completely forgotten by the scientific world. It remained so till the beginning of the present century, when it was brought prominently before the public by Bateson, the Cambridge naturalist. Independent, then, of Mendel's discovery, Mr. Milligan was experimenting with the hybrids on similar lines, and was within measurable distance of discovering the application of the Mendelian principles of crossing when circumstances arose that necessitated a discontinuance of his investigations at a period when he expected the next generation to produce the tail and other characteristics of the Lyre-bird. One cannot help regretting that these experiments in Mendel's principles of breeding had such an indefinite ending.

It has been asserted that the Lyre-bird has a predilection for hazel scrub by reason of the attraction this particular species of vegetation has for certain insects, whose larvæ, sheltering as they do among the roots of the hazel, are claimed to be the bird's chief, if not sole, source of subsistence. The bird, I am quite satisfied, is eminently cosmopolitan regarding the nature of the vegetation it frequents. I have seen them in scores amid golden wattle, ferns, musk, cassinia, blanket-wood, &c. A loose vegetable mould, replete with the larvæ of insects, particularly the Land Shrimp, *Talitrus sylvaticus*, is their quest by day. Wherever this compost is found, be it under any kind of vegetation, there you will find the Lyre-bird, or unmistakable evidence of its energy in large areas of scarified ground, for, whilst the mixture affords every facility for the full operation of the powerful claws with which the bird has been provided by natural selection, it is eminently adapted for the propagation of insect life.

It appeared to me that the birds in the Crooked River district congregated more in the valleys trending south from an axis of elevation than in those trending north. I repeatedly remarked the paucity of birds in apparently favourable valleys flanking spurs having a northerly extension. This may be due to the sun's rays striking with greater power on a northern than on a southern slope, thereby rendering the former, by

reason of the greater evaporation of moisture, less congenial to the larvæ of insects on which the Lyre-birds wholly subsist.

In the vicinity of the Dargo High Plains, when the snow lies thick on the hills and in the valleys, and converts the pellucid brooks that meander amongst the tree-ferns in the deep ravines into broad sluggish streams of half-frozen mush, when the gums are weighted with a fleecy mantle that occasions the destruction of many a slender spray and sturdy limb, and the less robust vegetation beneath its accumulated burden droops earthwards, rendering unfamiliar familiar spots, then the Lyre-birds, like the wombats and the wallabies, undoubtedly find it hard to obtain a sufficiency of food. They may then be observed on the crests or slopes of the hills under some log or fallen tree where the radiation of heat on the side opposite the sun has melted the snow and afforded them an opportunity of scratching the ground in quest of insect larvæ. When thus occupied they are not difficult to approach. Often in the gloaming, as one progresses noiselessly through the silent colonnades of the woods, he is startled as a dark object darts out from beneath some snow-swathed log near at hand, and with a sudden shrill cry speeds across a white expanse towards the covert margining a brook in an adjacent valley.

The chief calls imitated by the Lyre-birds in the Crooked River district were those of the Butcher-bird, Satin-bird, Laughing Jackass, Harmonious Thrush, Black and Gang-Gang Cockatoos, Strepera, Pennant's Parrakeet, Rosella, Wonga Pigeon, White-throated Thickhead, Cuckoo-Shrike, White-throated Tree-creeper, Pallid Cuckoo, Red Wattle-bird, and Leatherhead. The call of the Coachwhip was also imitated, but I failed to see or hear the bird during my residence in the neighbourhood. The call, I assumed, was transmitted from bird to bird from a locality where the *Psophodes crepitans* abounded. The sustentation of the Jackass's laugh was, in every instance, not of sufficient volume and duration to deceive one, and there was a lack of weirdness in the cry of the Black Cockatoo; but all other renderings were perfect imitations of the calls of the birds mimicked.

Lyre-birds are comparatively poor fliers, and, as a general rule, trust more to their legs than to their wings to effect escape from danger. The nature of the country they frequent—for the most part deep, narrow valleys filled with a heterogeneous growth of almost impenetrable vegetation—renders flight a less effective means of escaping danger than running. Hence the practical disuse of the wings during successive generations has undoubtedly rendered the bird's flight weak and laborious. When about to take flight they invariably launch off a log or ledge of rock on the hillside, or from some

low tree whose branches they have gained by a series of devious, hurried, and ungainly jumps. They then glide gracefully over the tops of the vegetation to some secluded retreat in the valley beneath.

The female nests preferably in a hollow stump, although many nests may be noted practically on the ground amid a clump of vegetation, or in a cavity in the face of a cliff. In some gullies and ranges frequented by the birds, decayed gums are the exception rather than the rule. The demand, consequently, is greater than the supply, and many hen birds have of necessity to begin housekeeping on Nature's basement instead of an airy attic. The assumption that the bird has acquired the habit of nesting in stumps since the acclimatization of the fox is undoubtedly an erroneous one. The hen bird would have to sustain many losses in eggs and chicks before it would become obvious to her that high nesting was the only expedient by which she could rear her young. This deviation from a long-continued habit of ground-nesting would probably influence her offspring to a greater or less extent. In any case, however, it would require the lapse of a greater period of time to bring about the more or less common condition of nest-selection now prevailing than the fox has been at large in Victoria.

The birds frequenting the locality under consideration had certainly no cause to fear the fox, since it was neither seen nor heard nearer than 150 miles of their habitat. One bushman, with whom I held brief converse on the subject of the Lyre-bird nesting in hollow stumps, contended—and the contention has a greater merit of probability than the fox theory—that the habit was acquired to escape the pressing attentions of the carnivorous brush-tailed bush rat, an animal well known from its depredations on the housewife's poultry. A sly query, however, relative to the arboreal qualifications of this noctivagant induced the bushman to discreetly evidence a keen interest in the probable source whence the rich "runs" of alluvial gold formerly obtained in the creeks and gullies of the Crooked River district originated. Wishing to dispose of the subject as expeditiously as possible and revert to the Lyre-bird and its habits before we reached the parting of the ways, I made a significant motion of the hand upwards to indicate the thousands of feet of Silurian rock which, arguing from existing evidence, the auriferous quartz-veins had permeated, and which had been removed by a long and continuous process of disintegration and transport. The bushman regarded me with unwinking scrutiny for a few moments and then spurred away, with the brief parting expression, "Be good." I have since concluded that he must have interpreted

my gesture to mean a celestial rather than a sub-aerial process of waste and accumulation for the presence of gold in the creeks and gullies of the district.

The cock Lyre-bird is generally conceded to be a monogamist. If, however, he is subjected to close observation in his native wilds, one begins to doubt the justice of this conclusion and to entertain the belief that, like the cock Malurus, he has a leaven of Mormonism in his composition, or, in other words, he is a polygamist. My conviction on this point is by no means firm. I may be grossly maligning our feathered prince of mimicry by even hinting at such a possibility. At all events, if, among other indiscretions that would seem to warrant the assumption of polygamy, he will persist in the nesting season in wandering o'er hill and dale, as I have often noted, in company with several of the weaker sex, he has only himself to blame if the "lord of creation" endows him with a greater bump of amativeness than he really possesses. To the contention that he might be exercising the part of a guardian in these rambles, I would reply that the male birds I encountered were all first-class exponents of the truism "Self-preservation is the first law of nature." On damp, foggy mornings I have often encountered the male bird, in company with two and sometimes three hens, on the crests of the ranges. During these rambles I have not heard the bird mimic the call of any member of the feathered tribe in the neighbourhood. He invariably gave utterance to his peculiar note, "Tchoo, tchoo, tchoo," from some log or fallen tree.

The remembrance of many pleasant days spent amid the Silurian hills of North Gippsland often reverts to mind as in the country I pass, at dawn or dusk, some unkept box-thorn hedge, wherein have congregated hundreds of noisy sparrows and starlings. All are cheerful and content, and are chirping away in various keys, and the air seems to throb with the sound they occasion. My memory then recalls a narrow Y-shaped valley filled with a luxuriant and varied growth of vegetation. Steep, heavily-timbered slopes encompass it. Two purling brooks cascade from lateral valleys to combine and flow south along the main syncline to the river some miles distant. As the twilight deepens the Lyre-birds, amid the umbrageous coverts of the valley and those on the encompassing slopes, loudly herald the approach of night. Bird answers bird till the volume of sound their cries occasion surpasses description. Night falls apace, and silence broods over the scene, broken occasionally by the pleasing call of the Boobook Owl and the harsh, nasal cry of the Great Flying Phalanger, but more often by the Lyre-birds. The first faint flush in the heavens heralding the advent of day is the signal for vocal effort. Gradually the chorus swells in intensity till, as at

nightfall, the volume of sound arising from the valley would seem to fill the universe. As the birds quit their roosts and begin to forage for food the sound becomes less localized and more intermittent, and finally degenerates into a series of vocal contests from the various whistling-beds on the slopes of the valley.

Under the conditions that then obtained, the pleasurable feature of this valley and many other similar valleys of North Gippsland might have prevailed for many human generations. Then, fifteen years ago, neither the rabbit nor the fox was known in the locality ; to-day the valley teems with both. And the Lyre-birds ? Well, shortly prior to the death of the energetic and observant secretary of the junior section of the Club, Mr. C. Stout, who was conversant with the neighbourhood under review and with the large number of birds which domiciled in the valley, I put the query—"Are the Lyre-birds as numerous as formerly in the neighbourhood ?" His reply, based upon the observations of a then recent visit to the spot, was, " You would not hear or see one a now in week's ramble."

THE GEOLOGICAL SURVEY OF VICTORIA.—Bulletin No. 25 is devoted to an account of the Woolshed Valley, Beechworth, by Mr. E. J. Dunn, F.G.S., late Director of the Geological Survey of Victoria, with petrographical notes on the Beechworth granites by Mr. D. J. Mahony, M.Sc., F.G.S. The author's description of the tremendous amount of denudation represented by the Woolshed Valley is extremely interesting. Cubic miles, he says, of granite rock have been removed grain by grain, and the whole is so rounded off that the vast period of time required for such action cannot even be estimated. Beechworth has long been celebrated for the variety of its minerals. Twenty-six are listed, in which, besides the more useful metals, such as gold, tin, and bismuth, are included gems such as diamond, carnelian, topaz, sapphire, and garnet, but those found have all been of small size. Enhydros or water-stones form one of the most remarkable of the Beechworth minerals. They consist of many-sided shells of brownish-yellow chalcedony, which in some cases are lined with quartz crystals. Some of them, however, contain a fluid and an air bubble, and their supposed method of formation is another interesting story.

WILD-FLOWER SHOW.—The Girls' Realm Guild of New South Wales intends holding a wild-flower show in the Sydney Town Hall on 3rd, 4th, and 5th of September next. Prizes are offered for pot-grown native plants, also dried collections, as well as photographs and artistic work based on the native flora. Full particulars are given in the prize schedule, which may be obtained from Miss G. E. Burrows, Vickery's Chambers, Pitt-street, Sydney.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 11th May, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 100 members and visitors were present.

REPORTS.

A report of the whole-day excursion to Beveridge on Saturday, 25th April, was given by the leader, Mr. J. G. O'Donoghue, who said that only four members besides himself took part in the outing. On arrival at Beveridge the party proceeded to Mount Bland, distant about half a mile to the west of the station, and thoroughly examined the mount, which is a fine example of a breached volcanic crater, and of which a short description appeared in the *Naturalist* of May, 1909, in the report of a former visit. After lunch it was decided to take the ten-mile walk across the country to Whittlesea, and so save the long wait for the evening train at Wallan, as had been first intended. A few chains after crossing the Merri Creek timbered country was entered, in which several eucalypts were noted, such as Blue Peppermint, *E. dives*, Snow Gum, *E. pauciflora*, Candle-bark, *E. rubida*, Yellow Box, *E. melliodora*, and Narrow-leaved Peppermint, *E. amygdalina*. The Snow Gums were well laden with fruit capsules, as many as fifteen being counted in one umbel. From some of the hilltops interesting views were obtained towards Mount Disappointment, Glenvale, and the Toorourrong Reservoir. Whittlesea was reached about dusk, where late tea was obtained before taking the evening train for town. The day proved an ideal one for walking, and the members of the party were greatly pleased with the outing, even though it was not productive of many specimens for the collector.

A report of the visit to the Geological Museum on Saturday, 9th May, was given by Mr. F. G. A. Barnard, who said that the party had been met at the Museum by Mr. D. J. Mahony, M.Sc., of the Mines Department, the leader for the day. The plan of the arrangement of the Museum was first pointed out, then the various exhibits were examined more closely, the leader calling attention to the economic value of a great many of the specimens, such as the sludge from the mines at Ballarat, from which excellent roofing tiles and pottery is being made.

Mr. Hardy, F.L.S., reported that two members besides himself took part in the junior excursion to Studley Park on

Saturday, 2nd May. The various trees were brought under review, and an instructive afternoon was spent.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. John R. Mann, Mines Department, Melbourne, and Mr. Walter Webb, 430 Little Collins-street, Melbourne, were duly elected ordinary members, and Mr. David John Paton, "Glenlee," 80 Anderson-street, Bendigo, as a country member of the Club.

GENERAL BUSINESS.

Messrs. D. Best and J. Stickland were elected to audit the accounts for 1913-14. Nominations for office-bearers for 1914-15 were duly made.

Mr. J. R. Tovey gave notice of his intention to propose, at the annual meeting in June, the following alteration to rule 4, clause *d* :—"That the words 'and over the age of sixteen years' be deleted."

Mr. Rosenhain said he wished to draw the attention of the Club to the fact that the South Melbourne City Council were about to plant trees along St. Kilda-road, and moved that the committee write and endeavour to get some native trees and shrubs planted. This was seconded by Mr. Keartland. Messrs. Wisewould and J. Gabriel supported the motion, which was carried unanimously.

Mr. St. John drew attention to the presence of Mr. R. T. Baker, F.L.S., Curator of the Technological Museum, Sydney. The president cordially welcomed Mr. Baker to the meeting.

In responding, Mr. Baker said it gave him great pleasure to be among the members of the Club, and he was very thankful for their kindly welcome, and mentioned that he looked forward every month with interest to the receipt of the Club's journal, the *Victorian Naturalist*.

PAPER READ.

By Dr. T. S. Hall, M.A., D.Sc., entitled "Notes on the Gippsland Lakes."

The author, in the course of an interesting paper, illustrated by lantern slides, traced the extent of the Gippsland Lakes, which were formerly estuaries of rivers, but had become lakes by the action of sand-dunes, which still continue to form along their seaward margins. The position of portion of the old coast-line was still marked by cliffs of marine Tertiaries in several places. He said that it seemed probable that the altered conditions which now exist could be traced to the breaking-down of the land-bridge which once existed between Australia and Tasmania and the probable change in the ocean currents which followed the formation of Bass Strait.

The chairman said the thanks of the Club were due to the author for his very interesting and instructive paper.

Messrs. A. D. Hardy, G. A. Keartland, and A. H. E. Mattingley took part in a short discussion which followed.

NATURAL HISTORY NOTE.

Mr. J. Searle forwarded the following note:—Amongst the material collected by Master Karl Glance on Phillip Island during the Easter excursion of the Club was a fresh-water Copepod, not previously described, and which may prove to be the type of a new genus. Unfortunately, from want of experience, the young collector included a large quantity of mud and *débris* in the bottle with his captures, which made the task of isolating the smaller specimens very difficult. However, at my request, he had also brought back with him samples of mud from dried-up pools on the island, and from one of these I have succeeded in rearing quite a number of Copepoda. These have now reached maturity. Several of the females are this morning (11th May) bearing egg-sacs, so I hope at a future meeting to be able to describe this new species.

EXHIBITS.

By Mr. F. G. A. Barnard.—Stone from Old St. James's Cathedral, Melbourne, quarried near Moonee Ponds Creek, about Kensington, in 1840.

By Mr. F. Cudmore.—Aboriginal axe from Diamond Creek, Victoria; clay wasp's nest used instead of stone in aboriginal's fireplace (stone scarce in the locality), Lower Darling River, New South Wales; specimen of clay usually used as above.

By Mr. C. J. Gabriel.—Shells from beach and dredged off Portsea, including *Ancilla petterdi*, Tate, *A. edithæ*, Pritchard and Gatliff, and *A. marginata*, Lam.

By Mr. A. L. Scott.—Siliceous sinter from North Island, New Zealand.

By Mr. P. R. H. St. John.—Young plant of *Eucalyptus Perriniana* (showing connate leaves), raised from seed collected by Dr. Heber Green at Dargo, 3rd January, 1914.

By Mr. H. Whitmore.—A specimen of the Gastropod, *Scutus anatinus*, Don., commonly called Elephant-fish, collected at Phillip Island during the Easter excursion.

After the usual conversazione the meeting terminated.

AUSTRALIAN BUTTERFLIES.—We learn that the long-promised work on the butterflies of Australia, by two of our members, Messrs. G. A. Waterhouse, B.Sc., F.E.S., and G. Lyell, F.E.S., is at last in the press. It will be available in August. There are to be over 900 figures, and a glance at some of the plates afforded us great satisfaction on that essential point. The published price of the work will be two guineas.

THE GRAMPIANS REVISITED.

By J. W. AUDAS, F.L.S., National Herbarium, Melbourne.

(Read before the Field Naturalists' Club of Victoria, 9th March, 1914.)

RATHER more than twelve months ago I had the pleasure of reading before the Club a paper descriptive of a visit to the Grampians (Vict. Nat., February, 1913, vol. xxix., p. 146), and, though it might seem that the subject had then been dealt with in an exhaustive manner, those who know the Grampians will remember that there were still many parts left unvisited. In order to make further acquaintance with these mountains and their charming flora I paid another visit to Hall's Gap in October last, when I was fortunate in sharing the company of eight other excursionists, each an enthusiast in his own line, and the records of our outings were preserved in ways which, to one who collects specimens in the ordinary manner, seemed delightful. One member (Mr. Relph) secured photographs of many beautiful plants in their natural surroundings, while another (Mr. Dickins) recorded their beauties of colour with his facile brush.

Of the many expeditions, perhaps the most interesting was that to Mount Difficult, portion of the northernmost range of the Grampians system, and an eminence which adequately bears out its name. I was, however, aware that the locality had not been botanically examined, and did not allow myself to entertain any qualms regarding the difficulties to be surmounted in ascending it. Starting out in a south-westerly direction from Hall's Gap, and working round Quarry Hill for a distance of about six miles, we passed on to a number of gullies whose unexplored condition aroused a sort of proprietary interest among us, which we exercised by bestowing upon them names we considered appropriate. For instance, one delightful valley through which rippled one of the many streams characteristic of the Grampians we called "Caladenia Creek," because on its slopes we found the orchid, *Caladenia congesta*, in two strange forms. The first was a clump of bright bronze colouring, so unlike the ordinary forms that for a moment we fancied ourselves the fortunate finders of a new species. The other consisted of fine spikes of ordinary colouring, but each bearing the unusual number of four flower-heads. Hereabouts also flourished *Humea elegans*, a plant which, from its general appearance, would undoubtedly be taken to be one of the Amarantaceæ, but which is really a composite. It is, when blooming, a very fine sight, its large bractlets hanging in graceful showers, coloured generally pink, but sometimes seen in white or crimson. The large, soft-textured leaves exude a gummy substance which causes them

to adhere most tenaciously to clothing, and sets up an irritation of the skin if allowed to come in contact with it.

Continuing our way to the mount, but before undertaking the serious business of the ascent, we roamed over a small eminence, literally gleaming gold and white in the sunlight, beneath its flowering cover of *Brachycome diversifolia*, commonly known as Tall Daisy, suggesting to us the name "Daisy Hill," which we hope it will bear in future. A series of perpendicular cliffs with alternating ledges comprise the natural features of Mount Difficult, and while forcing our way upwards we were not rewarded by the sight of anything sufficiently out of the ordinary to raise our enthusiasm, the only brightening feature of the ascent being the vivid green of great moss-covered boulders, further beautified by multitudinous blossoms of that pretty little plant, the Purple Bladderwort, *Utricularia dichotoma*, often called "Rock Pansy," and by some known as the "Shellflower." Quite a forest of young Hickory Wattles, *Acacia penninervis*, was in existence here, though no older trees were observed. This wattle might easily be mistaken for the Golden Wattle, *Acacia pycnantha*, to which it bears a strong resemblance both in bloom and foliage. A distressing feature to note was the destruction of practically all the Varnish Wattles, *Acacia verniciflua*, by an insect, whose ravages were similar to those of *Paropsis orphana* (the fire blight), but whose depredations seemed, fortunately, limited to this particular species.

On reaching the summit, a height of 2,300 feet above sea-level, we were amply rewarded for our arduous climb by finding that interesting composite *Olearia (Aster) speciosa*, which was first discovered by Mr. W. R. A. Baker, of the Melbourne Botanic Gardens, in 1888. It was at that time supposed to be *O. myrsinoides*, and it remained to Hutchinson to discover twenty years later that it was an unknown species; seeds were raised in 1907 at the Royal Kew Gardens, London, and subsequently plants grown from cuttings. It develops into a rather straggling shrub, about three feet high, bearing flowers which differ from the better-known species by having fewer ray-florets, and the densely tomentose leaves are also very distinct. We also noted specimens of *O. ramulosa*, new var. *intermedia*, *O. asterotricha*, *O. myrsinoides*, and *O. lepidophylla*. The first-named presented a striking difference in the flower-head, being of pale blue colouring and much smaller than the normal form, in leaf resembling the type, and in flower-head *O. microphylla*. *Senecio odoratus* bore clusters of yellow flower-heads, and its variety *hypoleuca*, also in bloom, could be easily distinguished by the soft, downy under-surface of the foliage. Two *Pultenæas*, *P. styphelioides* and *P. villosa*,

grew near together, the latter bearing large quantities of flowers, but the former was just coming into bloom. *Restio complanatus* was very abundant in this vicinity, and one of the tea-trees, *Leptospermum lanigerum*, var. *grandiflorum*, grew well: its large white flowers are very handsome, and it should do well under cultivation, as it is of rapid growth. I was very pleased to find here all four of the *Brachylomas* which are indigenous to Victoria; they were *B. daphnoides*, *B. ericoides*, *B. depressum*, and *B. ciliatum*. The only member of the genus *Astrotricha*, *A. ledifolia*, known to our State was fairly abundant. It is often called "Mountain Star Hair."

The view from the mountain top also recompensed us for the climb. Lake Lonsdale stretched like a gleaming sheet of silver on the plain, with Glenorchy and Rupanyup (of which towns it forms the water supply) in the distance. Being about half way between the Grampian quarries and Hall's Gap, and rising rather abruptly from the plain, Mount Difficult seems to dwarf Mount Dryden into a mere hillock. The latter is somewhat of a curiosity, being of basaltic formation, while the greater portion of the Grampians is sandstone. Far away across the plains in an easterly direction could be seen Stawell and Great Western, and nearer at hand the beautiful farming centre of Fyans Creek.

Along the table-land we wandered for three miles through an area of gorgeous beauty, showing some of the finest heath, *Epacris impressa*, I have ever seen. It was, indeed, remarkable to find this plant blooming so beautifully at this late period (23rd October) of the year, for it had quite ceased on the lower altitudes. Some extra fine flower spikes were photographed by Mr. Relph. This table-land also revealed a fine crop of timber, mostly Messmate, *Eucalyptus obliqua*, and Stringy-bark, *E. macrorrhyncha*, as yet unsampled by the saw-miller, whose trail is amply apparent on most of the Grampian peaks. Seen in lesser quantity, but of particularly fine development, were the Narrow-leaved Peppermint, *E. amygdalina*, and Grey Gum, *E. goniocalyx*. Continuing in a southerly direction towards Hall's Gap, we found large quantities of six Pimeleas—*P. linifolia*, *P. axiflora*, *P. flava*, *P. phylloides*, *P. curviflora*, var. *micrantha*, and *P. spathulata*. The beautiful blooms of the latter, drooping from shrubs of sometimes five feet in height, were a sight of more than usual interest, while the variety *dichotoma* of *P. flava* displayed many forked branches of unique appearance. The Fringe Wattle, *Acacia Mitchelli*, one of the earliest bloomers of the genus, was laden with pods, and (due, doubtless, to the splendid rains of September) had industriously started upon another flowering period. *A. armata* and *A. verticillata* seemed to have adopted

a dwarf habit of growth in this part, but we noticed a few genuine dwarfs, among which were *A. juniperina*, *A. vomeriformis*, and *A. tenuifolia*.

After encountering some difficulty in forcing our way through the thick spiny growth of *Acacia oxycedrus*, we emerged upon a ledge clothed with the shrub, *Calytrix Sullivani*, which is typical of the district, and was first discovered by the late Mr. D. Sullivan, a school teacher of Moyston, who did much to elucidate the botany of the Grampians, and whose name is now perpetuated in this beautiful plant. Everywhere among the rocks, in luxuriant clumps, scenting the atmosphere with their delicious perfume, grew the boronias, *B. pinnata* and *B. pilosa*. Blooms of the former are largely sold in Sydney, where it grows exceptionally well, but it is not so often seen in our Melbourne streets, perhaps because it is not generally known that this lovely plant can be grown with ease in our own gardens. Reflecting the colour of the boronias, and also vying with them in luxuriance of growth, was *Tetratheca ciliata*. This little plant, although it bears a strong resemblance to the boronias, and is often called "Wild Boronia," belongs to quite a different order—viz., Tremandreae.

One of the shorter trips close to Hall's Gap, which can be accomplished in a half-day, though perhaps a little barren in botany, is the route to Bulliss Glen, along Indigo Creek, and thence to Chataqua Peak. On first setting out, the tourist in the spring months will be attracted by the beautiful blooms of *Acacia longifolia*, var. *mucronata*, making a truly gorgeous spectacle. Its lovely golden blooms are borne in seemingly burdensome quantities, and in this respect it proves more fruitful in pollen for the bees than most other acacias. The great feature at the Glen is a high cliff overhanging a deep valley, all down the sides of which grow ferns in great luxuriance and variety. Near the base was noted the King Fern, *Todea (Osmunda) barbara*, Common Tree Fern, *Dicksonia antarctica*, Common Shield Fern, *Aspidium aculeatum*, Fishbone Fern, *Lomaria discolor*, Soft Water Fern, *L. capensis*, Coral Fern, *Gleichenia circinata*, Umbrella Fern, *G. flabellata*, and Wire Fern, *G. dicarpa*. On the shelving rocks we obtained in abundance the Common Maidenhair, *Adiantum Æthiopicum*, with the violets, *Viola betonicifolia* and *V. hederacea*, var. *Sieberiana*. The sloping hillsides showed a variety of daisies, including *Brachycome scapiformis* and *B. multifida*, and near the top we noted the Rat-tail Fern, *Asplenium flabellifolium*, with the Common Rock Fern, *Cheilanthes tenuifolia*. Indigo Creek, named from the shrub *Indigofera australis*, which grows there plentifully and was blooming nicely, is another branch of this glen, and furnishes many pretty falls, which are of unique formation, the water often descending in curves and

double curves, due to the varying resistance of the sandstone over which they flow. From this point Chataqua Peak can be ascended with ease, although it would prove a tough undertaking if attempted on the other side. When the summit is reached, a view rich in many respects is enhanced by the beautiful Clematis Fall, which has a drop of 200 feet, and, during the winter months, when the volume of water is greatest, is a fine sight.

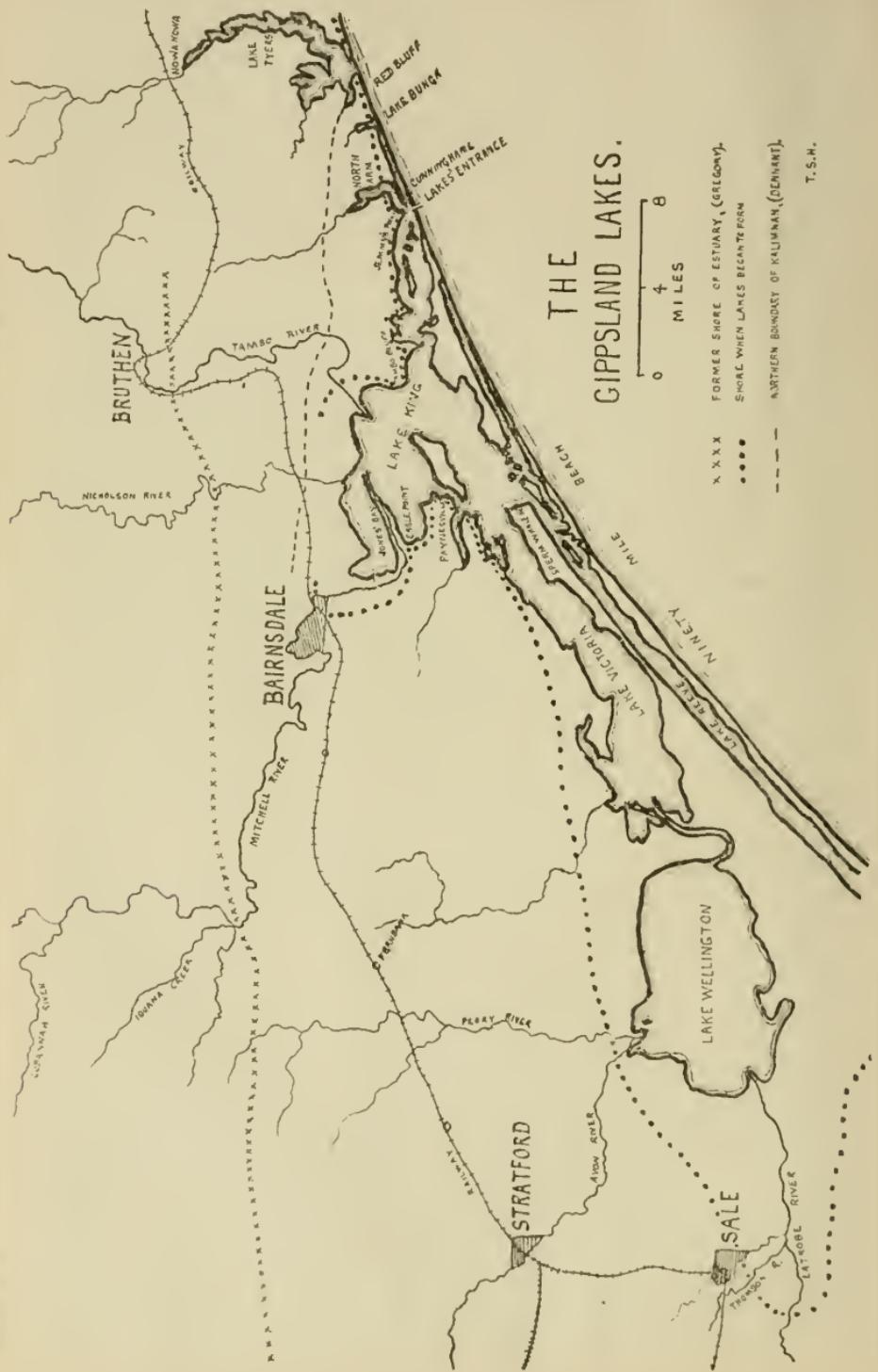
An area which proves intensely fascinating to plant-lovers is undoubtedly the "Wild Flower Garden," or what is much more generally known as the "Devil's Garden." Why such an unattractive name should be applied to this delightful part is a puzzle which remains to be solved. It may be reached by striking out in an easterly direction from Hall's Gap, and contains probably more species of plants than any similar area in Victoria, the one to force itself most prominently upon one's notice being the beautiful White Everlasting, *Helichrysum Blandowskianum*, with clusters of flower-heads borne on stalks of almost equal whiteness, which make it valued for wedding bouquets and wreaths. If the flowers are gathered before they are fully open, and dried in a cool atmosphere with their heads downward, they will last for many years. All these decorative qualities, however, are not sufficient to overcome the dislike in which it is held by pastoralists. They complain that it is injurious to stock, and it is considered cattle would be killed by impaction caused by its felty texture. Another everlasting flower, the Blue Tinsel Lily, *Calectasia cyanea*, locally called the "Satin Flower," is also seen among the smaller shrubs. Its blue flowers are delightfully glossy, and will last for some years. Two of the Melaleucas, *M. gibbosa* and *M. decussata*, were only approaching flower, but one of the Grevilleas, *G. parviflora*, was laden with snowy blossoms. Further along, on the sloping ridges, were noticed the two colours of *Gompholobium Huegelii* (yellow and red), while *Pultenaea humilis* formed dense matty patches. We seemed here to find a surfeit of red-flowering blooms, for, besides the two last mentioned, we found the dainty little shrub *Dillwynia patula*. This plant bears a strong resemblance to the Eutaxias, and was described by Baron von Mueller as *Eutaxia patula*. We found here also some specimens of the curious Flying Duck Orchid, *Caleana major*, and the "Old Man or Bearded Orchid," *Calochilus Robertsoni*. Alternating patches of white and yellow were caused by the presence of *Dillwynia floribunda* and *D. ericifolia* (in various shades of yellow), with *Conospermum Mitchellii* and *Leptospermum myrsinoides* (in white); while further on a greater variety was added to the colouring, where all forms of these species seemed abundant, more particularly the red *Dillwynia floribunda* and the pink *Leptospermum myrsinoides*.

Everyone has heard of the grass-trees of the Grampians, and all through this area we found *Xanthorrhœa australis* and *X. minor* in great numbers. They belong to the Liliaceæ, and generally flower profusely after bush fires, which circumstance will cause apiarists to quickly vacate the district, as the honey garnered from grass-tree flowers is of dark colour and inferior quality. This ill wind may be said to blow good for the bush bees, which reap a rich harvest, and the decaying trunks befriend them in yet another way by supplying a gummy exudation useful for filling cracks and holes in the hives. Following the track of a bush-fire with great rapidity, we noticed two invaders, *Phyllanthus thymoides* and *Haloragis Meziana*, and the progress of flames seemed also to create a condition favourable to the growth of fungi, *Lycoperdon cælatum* (one of the puff-balls), which, when broken, sends off a cloud of umber-coloured powder, which is alleged to cause blindness in sheep. Whether this fungus is such an evil-doer has not been proved, but, like the proverbial dog, its bad name will stick. While speaking of fungi I might mention the phosphorescent fungus, *Agaricus (Pleurotus) illuminans*, which we found near the decayed Red Gum timber further down. At night these plants show up like lights, and are used by bushmen as signals on the track. The lower flats yield good quantities of fine Red Gum, a timber which is unfortunately becoming scarce, and the higher flats are wooded by Messmate and Stringy-bark, both localities being used by saw-millers, providing a good source of local employment. Another source of income is the cultivation of the Black Wattle, *Acacia mollissima*, which yields a most profitable return as tanning bark, but the industry is being retarded by the depredations of rabbits. These pests eat up the young plants as soon as they appear above ground, and growers are therefore compelled to enclose their paddocks with wire netting. Most of the sixty-five species of Victorian acacias have but a very short blooming period, and it was interesting, therefore, to make the acquaintance of one which flowers throughout the year; this was *A. retinodes*, which we observed along the banks of the Fyans Creek. The richness of these flats has been proved by the fine crops they yield of potatoes and maize, and their fame is now enhanced by the knowledge that they are equally suitable for tobacco. The leaf raised on an experimental area of one acre yielded a net profit of £40, and was pronounced by Mr. Temple Smith to equal the best our State can produce.

Other trips were taken during my holiday, which, in such delightful surroundings ended far too quickly, but the notes already given must suffice for the present regarding that veritable botanist's paradise—the Victorian Grampians.

PLATE I.

THE GIPPSLAND LAKES.



SOME NOTES ON THE GIPPSLAND LAKES.

(With Map.)

By T. S. HALL, M.A., D.Sc.

(Read before the Field Naturalists' Club of Victoria, 9th Feb., 1914.)

EARLY in January of the present year I paid a long-promised visit to the Gippsland Lakes. The outward trip was made *via* Bairnsdale, whence a small steamer runs down the Mitchell and so to Cunningham, which is close to the new, or artificial, entrance to the lakes from the sea. The length of the steamer route is 25 miles. On the return journey I went by another steamer along the whole length of the lakes and up the Latrobe and Thomson Rivers to Sale, a distance of 75 miles. A week was spent at Cunningham, and from here a few short excursions were made. Some six years ago I went to Buchan by coach from Bairnsdale, passing through Bruthen, and some of the observations made on that trip are referred to.

The mode of formation of the lakes appears to be quite generally recognized, although nothing much seems to have been written on the subject till Professor J. W. Gregory published his "Geography of Victoria" in 1903. To this reference will be made later. Lakes King and Wellington are the remains of the estuaries of the Rivers Tambo, Mitchell, and Latrobe, and a few other smaller streams. The estuaries, which formed considerable indentations in the coast-line, have been cut off from the sea by a long and comparatively narrow rampart of sand, which forms the Ninety-mile Beach. This appears to have no definite topographical beginning or end, but a continuous sandy beach, with dunes and impounded swamps and lakes, stretches from Corner Inlet (where it begins with Snake Island) as far as Lake Tyers. Eastward of this there are many isolated similar tracts where swamps and lakes have been cut off from the sea by dunes, the most easterly of all being Mallacoota Inlet, near Cape Howe.

Similar conditions occur on the western end of our State coast-line. The mouth of the Glenelg is closed, as a rule, and a long line of swamps runs inside the dunes as far, I believe, as Cape Bridgewater. East of Portland the Narrawong Beach is of a similar character, and the same conditions prevail as far as Warrnambool, with the intermission of the basalt outcrop at Port Fairy. East of Warrnambool the same features are repeated, but on a small scale, where the mouths of the rivers are blocked and the estuaries are either lagoons or swamps, as at Curdie's Inlet, the rivers Gellibrand, Aire, Burrum, Airey's Creek, and the Barwon, where the Connewarre Lakes are fairly large (3,800 acres). Port Phillip has had its opening constricted by similar causes, and Anderson's Inlet and Shallow Inlet have arisen from the same drifting of sand in an easterly direction.

All these lakes and swamps are due to causes still in action, and are among the most recent of the geological features of our coast-line. The dunes that form their seaward margin are still being added to along almost the whole of their course. Behind the dunes the swamps and lagoons are gradually filling, partly by sand blowing in from seaward, but chiefly by the material washed down from the land. The old shore-line behind the swamps can generally be readily traced, and especially so when it was marked by cliffs.

In the Gippsland Lakes, differing entirely in character from the larger lakes, are three at the eastern end of the area—namely, the North Arm at Cunningham, Lake Bunga, and Lake Tyers. These are narrow, winding sheets of water, and are the drowned ends of river valleys which are deeply entrenched in the Tertiary plateau. They point to a subsidence of the coast-line. The great depth of silt in the Mitchell River at Bairnsdale, and at the crossing over the Nicholson, has given much trouble to the engineers on the new Bairnsdale-Orbost railway, and the long piles of the bridges have not found bottom. This also points to recent subsidence.

The Gippsland Lakes are bounded on their landward side by a gravel-capped plateau of marine Tertiary rocks; on the eastern side of the lakes the plateau ends in cliffs, now partly smoothed down by weathering, which are well marked from Tambo Bluff to Red Bluff, near Lake Tyers. Westward from Eagle Point, near the mouth of the Mitchell, the plateau slopes down to sea-level more gradually, and without going over the ground it is not always possible to mark the line on the map, though the high land is always visible from the steamer. Sale stands near the old shore, and from Paynesville to Sale the former coast appears to run almost straight. There is, however, some high land to the south of Lake King, from Sperm Whale Head to slightly west of Red Bluff, which is about a mile from the entrance of M'Lennan's Strait. This Red Bluff must not be confused with the similarly named one near the entrance to Lake Tyers. This high land I saw only from the steamer, and am not sure of its character. At first I felt sure it was part of the Tertiary plateau, but later, when we were abreast of Red Bluff, it was clear that the cliff there was dune. So I wrote "(?) Dune" along Sperm Whale Head on my map. Since my return I mentioned the matter to Mr. H. W. Wilson, who knows the lakes well, and he tells me that, though he has not landed on Sperm Whale Head, he thinks that red sands occur. This point needs looking into.

On the east side of Lake Wellington Mount Cunningham is marked on the map, but none of the ground rises much more than twenty feet, if as much, so that this has probably the distinction of being the lowest "mount" in Victoria.

As a correction in nomenclature, it may be mentioned that there are two small lakes between Sale and Lake Wellington called Kakydra and Melanydra. These are Greek words meaning "bad water" and "black water," and the names were probably given by some humorous Greek scholar. By dropping the tail of the "d" in both cases they have been transformed into "Kakyora" and "Melanyora," and in this guise masquerade on many of the maps.

The coast-line mentioned above is quite distinct from the much older coast-line which bounds the marine Tertiaries on the north, and forms what Professor Gregory marks on a map in his "Geography of Victoria" as the former shore of the Gippsland estuary. The marine Tertiaries consist of Barwonian overlain by Kalimnan. Along the course of the Lower Mitchell and on the eastern side of Lake King they have been described by Messrs. Dennant and Clark. They are far antecedent to the age of formation of the lakes, and have nothing to do with it.

While we are considering the question of geological boundaries, it may be pointed out that the marine Tertiaries extend further inland than is shown on the geological map of the State. The boundary appears to have been copied from Mr. Dennant's map showing the area of the "Miocene" (i.e., Kalimnan). He never attempted to mark the Barwonian area, and it is a very difficult thing to do, as exposures are absent over a large part of the district.

A striking feature of the Tertiary plateau to the north of the lakes is the presence of a great sheet of gravel and sand, which covers the district, as seen on the railway line, from Flynn's Creek to Bairnsdale. West of Sale sands predominate, but from Sale to Stratford coarse gravels are common, and the same may be said of the country from there to Bairnsdale. The same gravel plateau, deeply trenched by streams, extends along the Buchan road, with but a slight intermission, as far as Stony Creek. The rocks composing the deposit vary considerably; in places rounded quartz predominates, but in others quartzites and ferruginous hardened sandstones are very common. They evidently represent a waste-sheet from the mountains to the north.

Spread over such a wide extent of country, the exact limits of which I am unable to define even approximately, the amount of material is enormous. The thickness in places is great. Thus, at Fernbank, between Stratford and Bairnsdale, gravels were bored into to a depth of 400 feet. At Paynesville water was struck at 520 feet in terrestrial gravels, and at Sale they have been pierced for 300 feet.* Clear evidence of the age of

* "Rep. Inter-State Conference on Artesian Water," Sydney, Government Printer, 1913, at p. 7.

the gravels is shown at Red Bluff, near the mouth of Lake Tyers. The cliffs here consist of yellow and gray sands crowded with *Arachnoides incisa*, Tate, and are of Kalimnan (? Miocene) age. The sandstones contain a few quartz pebbles, which form intercalated sheets in the upper part of the cliff. The cliffs at Jemmy's Point show similar features, but, as they are overgrown by vegetation, they are not so convincing. The gravels are doubtless redistributed in places, but the age of the sheet capping the plateau appears clear, and they afford an interesting parallel to the gravels and sands of similar age which form a great part of the red beds near Melbourne. The Bairnsdale gravels are not ferruginous, as Tertiary basalts are practically absent from the district, and to these basalts is probably due the iron of the red beds of central and western Victoria.

The entrance to the lakes from the sea has varied considerably in position since it was first used by vessels. I was told by an old settler at Lake Bunga that not fifty years ago the entrance was bounded on its eastern side by the cliffs actually at Red Bluff. The Lands Department map of the lakes published in October, 1864, shows the opening close to Lake Bunga, about half a mile from the Bluff. The map published with Sir John Coode's report in December, 1879, shows the entrance about one and a half miles east of the Lakes Entrance Hotel, while the Admiralty chart (? 1906) shows the entrance at Lake Bunga.

The long, narrow channel from near Metung, past Cunningham, and so to Lake Bunga, is marked on the older maps as Reeves River; but with the artificial opening at Cunningham this name has been restricted, and the eastern sweep is now known as the Cunningham Arm.

There is now no trace of a channel eastward from the Lakes Entrance Hotel, the sand having drifted in and completely obliterated it. The history of this eastern end of the lakes is of interest, as we have historical evidence to confirm the interpretation that a geologist would put upon the features of the country. I am not prepared to discuss the origin of the gulf in which the Balcombian and Kalimnan deposits were laid down, nor of the later gulf bounded by these deposits which now forms the lakes. It is quite clear that the drifting sand which has cut off the gulf from the sea and so formed the lakes is geologically a recent deposit. The Ninety-Mile Beach is the straightest and most featureless coast-line that we have, whereas the older rocks which it has cut off from the sea formed a very irregular coast. It is clear from this that some remarkable change must have taken place in the action of the sea in the neighbourhood. Instead of cutting back into the land, it is heaping up deposits of sand along the shore, and the land

is encroaching on the sea. This implies a great recent change in the marine currents.

The only recent change of any importance that we are aware of in the disposition of land in the neighbourhood is the formation of Bass Strait. That the breaking-down of the isthmus is comparatively recent is amply proved by the almost complete agreement of the fauna of Tasmania and Southern Victoria. While the land connection between Tasmania and the mainland persisted the south-westerly oceanic drift was practically shut off from the great gulf on the east, and the New South Wales southerly current would persist further south than it does at present. The formation of the strait altered the conditions, and, as it is some 200 miles wide, the south-westerly drift would be felt far to the eastward through its opening. It is, then, I think, justifiable to ascribe the formation of the Ninety-mile Beach and the impounding of the Gippsland Lakes to the breaking-down of the connection of Tasmania with Australia.

The amount of detailed physiographic work that has been done on the lakes themselves is very small, and a large field of research is open to those who have opportunities for working in this interesting district.

I wish to thank Mr. H. W. Wilson for the loan of most of the lantern slides which were used in illustration of this paper, and also Mr. R. L. Miller for specially preparing some for the occasion.

AUSTRALASIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—The volume recording the 1913 (Melbourne) meeting of this association has been issued with greater promptitude than characterized some of its predecessors. It is the fourteenth of the series, and, like the previous volumes, contains a mass of valuable information, extending to more than 700 pages. Professor David's inaugural address deals with a variety of matters of interest, while the addresses of the presidents of sections are, each of them, valuable contributions to science. Unfortunately, want of funds again necessitates numbers of titles only of papers being printed, some of which are sure to cause longings for the full paper when perusing the volume.

THE SOLDANELLA.—Our fellow-member, Mr. G. Weindorfer, Kindred, Tasmania, writes correcting a misstatement regarding the Soldanella which occurred in the last *Naturalist* (May, 1914), the plant being attributed to the Compositæ, whereas it is a member of the Primulaceæ. He says that the flowering of the Soldanella amidst snow and ice takes place, not in early spring, but in late summer, and remarks that the faculty of removing a thin layer of snow or ice in order to lengthen its

vegetative period is not confined to species of the European alpine flora, for he has observed that *Ranunculus Gunnianus*, H., flowers under similar conditions in the Cradle Mountains of Tasmania, about 5,000 feet above sea-level.

EELS.—“Physicus,” in the *Australasian* of 30th May, calls attention to a review of recent publications regarding eels, which appeared in *Nature* of 16th April. The principal work is that by Dr. Grassi, in which he points out that the mystery of eel reproduction has existed for many centuries, for Aristotle, the Greek philosopher, writing in 350 B.C., inclined to the belief that eels sprang from earthworms, and much the same ideas obtain to-day. Notwithstanding the investigations carried on for many years, it can still be said that no one has ever yet found an eel with its reproductive organs fully developed. Seeing that eels are so plentiful in the southern portions of Victoria, here is a chance for someone to solve the mystery, and in so doing achieve world-wide fame.

THE REPTILES OF FLINDERS ISLAND, BASS STRAIT.—During the visit of the Royal Australasian Ornithologists' Union party to Flinders Island in November, 1912, three snakes and four lizards were collected by Captain S. A. White, and presented by him to the South Australian Museum, Adelaide. It may be of interest to make a brief record of the species. The snakes, as well as the lizards, are represented by two species which occur both in Tasmania and Australia.

Denisonia superba.—Large-scaled Snake or Copper-head, also known as the Diamond Snake of Tasmania. Two specimens, measuring 33 and 48 inches in length respectively. Previously recorded from New South Wales, South Australia, and Tasmania. (Venomous.)

Notechis scutatus.—Tiger Snake of South Australia and Victoria, also known as the Brown-banded Snake of New South Wales. One specimen, measuring 50 inches in length. Previously recorded from Australia and Tasmania. (Venomous.)

This is a specimen of the melanotic variety, which has also been found at the southern extremity of Yorke's Peninsula, South Australia, and from some of the islands of Spencer Gulf.

N.B.—The above measurements were taken after the specimens had been preserved in spirit; these are, therefore, less than they would have been in life, on account of shrinkage.

Tiliqua nigrolutea.—Black and Yellow Blue-tongued Lizard. One specimen. Previously recorded from South Australia and Tasmania.

Amphibolurus angulifer.—Three specimens. Previously recorded from south-eastern Australia and Tasmania.—F. R. ZIETZ, Adelaide, S.A.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE thirty-fourth annual meeting of the Club was held in the Royal Society's Hall on Monday evening, 15th June, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, but, owing to unfavourable weather conditions, the meeting was poorly attended, only 24 members being present.

CORRESPONDENCE.

From Railway Department, in reply to a communication from the Club, intimating that no planting had been done on the slopes of the railway cuttings at Footscray, Royal Park, Flemington Bridge, Heidelberg, Windsor, Burnley, Hawthorn, and East Camberwell, whilst at other places specified planting had only been carried out in such a way as to leave sufficient spaces on the slopes to enable the strata to be clearly seen. For reasons cited in memo. of 11/5/08 to the Club, the Commissioners could not sanction the erection of notice boards at the cuttings. On the motion of Messrs. Barnard and Searle, the matter was referred to the committee for consideration.

From South Melbourne Council, acknowledging receipt of the Club's request *re* planting of native trees and shrubs in the plantations along St. Kilda-road, and intimating that it had been referred to the public works committee.

From Victorian Executive for approaching visit of the British Association for the Advancement of Science, intimating that Tuesday, 18th August, had been reserved for a reception, by the members of the various scientific societies in Victoria, to be held in the Botanic Gardens, and requesting to be informed of the amount the Club, or its members, would contribute, a donation of 2s. 6d. entitling the donor to one invitation card. The president briefly referred to the announcement on the subject in the *Naturalist*, and requested those who purposed attending the function to furnish the secretary with their names, and the number of invitation cards required, as early as possible.

REPORTS.

In the absence of Mr. A. James, Mr. A. L. Scott reported on the excursion to Maribyrnong on Saturday, 23rd May, having for its object physiography. The attendance was meagre, owing perhaps to threatening weather, but the afternoon proved fine, and a pleasant ramble was enjoyed.

Mr. C. French furnished a report of the visit of about twelve members of the Club to the Museum of Economic Entomology

and Vegetable Pathology on Saturday, 13th June. Two hours or so were spent in examining the various collections of insect pests of Victoria, including those of forest trees, samples of various fruits showing insect pests, insectivorous birds and their nests, and samples of foodstuffs showing damage caused by insects, &c. In the Pathologist's Branch attention was directed to specimens of diseased fruits, &c., preserved in formalin. The mycological collection and the herbarium were also inspected with interest.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. L. G. Chandler, 56 Dixon-street, Malvern; Mr. L. P. Winchcombe, 466 Little Collins-street, Melbourne; and Miss O. B. Davies, Trinity College Hostel, Sydney-road, Parkville, were duly elected ordinary members; and Mr. T. Alexander, Grange School, Domain-road, South Yarra, and Mr. D. Mitchell, Cave Hill, Lilydale, as associates.

GENERAL BUSINESS.

Mr. J. R. Tovey, in accordance with notice previously given, moved the omission of the words "and over the age of sixteen" in clause (d), rule 4, and briefly outlined the reasons that necessitated the deleting of the words specified. The motion was seconded by Mr. J. Gabriel and carried.

Mr. O. Rosenhain referred to a recent paragraph in the *Argus* respecting the alleged damage to grass by large numbers of Black Swans at The Heart, near Sale, and to the subsequent announcement in the same paper that the Chief Inspector of Game had granted permission to the owner of the property to which the birds resorted to destroy them up to the end of July. In his opinion, the Club should take immediate action to prevent the destruction of these beautiful birds.

Mr. D. Best said that a deputation should wait on the Chief Inspector of Game and obtain the actual facts of the case.

After some discussion, in which Messrs. Searle, Gabriel, Hardy, St. John, and Rosenhain took part, Mr. A. D. Hardy moved, and Mr. J. Searle seconded—"That the president and Mr. Rosenhain wait upon Major Semmens and ascertain the facts of the case." The motion was carried.

Mr. C. L. Barrett said he would like to see something done towards suppressing the laying of poison for rabbits, whereby immense numbers of our insectivorous birds were destroyed, and suggested that the Club join with other kindred societies in a deputation to wait on the Chief Inspector, Mr. F. Allan, and discuss the matter with him.

In the discussion which ensued, Messrs. Rosenhain, St. John, Gabriel, Scott, and the President took part. Mr. A. D. Hardy read extracts from a lengthy memorandum by Mr. F. Allan,

wherein he ridiculed the contention that the native birds were being destroyed in any number by the departmental system of laying poison for the destruction of rabbits, and on behalf of Mr. Allan invited any person to be present at a poisoning and see for himself if any destruction of birds took place. Messrs. C. L. Barrett and J. Gabriel offered to undertake the duty.

ANNUAL REPORT.

The hon. secretary, Mr J. R. Tovey, read the thirty-fourth annual report for the year ended 30th April, 1914, which was as follows :—

“ TO THE MEMBERS OF THE FIELD NATURALISTS' CLUB OF VICTORIA.

“ Ladies and Gentlemen,—Your committee have the honour to submit for your consideration the thirty-fourth annual report, in which are shown the operations of the Club during the year ending 30th April, 1914.

“ The year has been an uneventful one, but a considerable amount of useful work has been done.

“ During the year 34 new members were elected, consisting of 18 ordinary, 8 country, 2 associate, and 6 junior members. At the September meeting of the Club it was decided to repeal clause (e) of rule 4, relating to junior membership, and no further nominations for junior members have been made. However, an amendment of rule 4, by the repealing of a portion of clause (d), has been proposed, and should thus provide for those promising juniors who might come in as associates, the maximum age of admission as associates being limited only. The total membership of the Club amounts to 236, and the following is the detailed list :—6 honorary, 2 life, 143 ordinary, 64 country, 5 associate, and 16 junior members (for this year only). The total membership thus shows a decrease of 67 when compared with last year, but the reduction has been caused principally by the falling-off in the number of junior members. The new members elected exceeded the resignations.

“ We regret having to record the loss by death of three members, to whom reference has already been made in the *Naturalist*. Mr. Charles Stout, who died on the 18th of May, 1913, was a promising young member, who, in addition to taking an active interest in the Club's affairs, for some years acted as honorary secretary for juniors, and was largely responsible for the holding together of that group. Dr. Alexander Morrison, who was a member from 1884 until his death in December, 1913, was for some years Government Botanist for the State of Western Australia, his death occurring in Victoria while engaged on botanical work for the Common-

wealth Government at the National Herbarium, Melbourne. Mr. Charles Maplestone died in January, 1914. He was a well-known worker in polyzoa and bryozoa, and the results of his researches will endure in the 'Records of the Australian Museum,' the 'Proceedings of the Royal Society of Victoria,' and the *Victorian Naturalist*.

"The attendance at the ordinary meetings has been maintained, and averaged about 50.

"During the year 18 papers were read, 10 of which were devoted to botany, 7 to zoology, and one to palaeontology. Most of these have been published in the *Victorian Naturalist*. The authors were:—Messrs. J. W. Audas, F.L.S., R. T. Baker, F.L.S., R. A. Bastow, F. Chapman, A.L.S., G. B. Doyle, J. Gabriel, J. H. Gatliff and C. J. Gabriel, J. C. Goudie, A. D. Hardy, F.L.S. (two), T. S. Hart, M.A., R. Kelly (two), J. A. Kershaw, F.E.S., J. G. O'Donoghue, O. Sargent, J. Searle, and H. B. Williamson.

"Two illustrated lecturettes were also given—the first by Mr. F. Chapman, A.L.S., at the September meeting, entitled 'Victorian Fossiliferous Limestones and their Correlatives in Other Lands,' and the second, at the December meeting, by Professor A. J. Ewart, D.Sc., entitled 'The Senses of Plants.'

"Illustrated reports of excursions were given by Mr. J. Gabriel and Dr. E. B. Nicholls, Mr. F. Chapman, A.L.S., and Mr. F. G. A. Barnard.

"Your committee considers that there is room for expansion in the way of natural history notes and in the variety and quantity of exhibits at the ordinary monthly meetings, these being of great interest to members, more especially to those to whom the special and often technical papers do not appeal.

"The annual exhibition of wild-flowers was held at the October meeting in connection with the Victorian Forest League's exhibit of timbers, &c., as a section of the Australian Manufactures Exhibition, but it was found that neither the attendance at the ordinary meeting nor the flower show patronage was of a nature to justify a repetition of this experiment.

"At the last annual meeting Dr. J. A. Leach, D.Sc., was elected president of the Club. However, in August he found that his official duties would prevent him giving that time to the affairs of the Club which he considered necessary. He therefore forwarded his resignation of the office, trusting to be able at some future time to resume his position as an office-bearer. Mr. J. A. Kershaw, F.E.S., one of the vice-presidents, was then elected president, Mr. F. Pitcher filling the vacant vice-presidency, and Mr. P. R. H. St. John succeeding Mr. Pitcher as a member of the committee.

"A report of the Plant Names Sub-committee has been forwarded by the honorary secretary, Dr. C. S. Sutton, and is as follows:—Six meetings of the Plant Names Sub-committee were held during the year. After completing the provisional naming of the plants of our census, the sub-committee occupied itself in the revision of the third and last section for the printer. At the instance of the Curator of the Industrial and Technological Museum, Mr. R. H. Walcott, the 'Catalogue of the Economic Woods of Victoria' was also revised, in view of its re-issue as a new edition. The balance of the second section of the flora—Chenopodiaceæ to Haloragaceæ—was printed in the *Journal of the Department of Agriculture* for February, 1914, and reprints of the whole of the section as it appeared in the issues of July and September, 1912, and February, 1914, became available for distribution last month. It is hoped that members and others will apply for copies of the reprints and favour the sub-committee with their criticism as soon as possible.

"The excursions were rather poorly attended during the year, the increased demand on the youth of the State for military drill being to some extent the cause. However, several interesting outings took place, when members had opportunities of becoming acquainted with objects which, without capable leaders, might easily be overlooked. It is gratifying to record that the Club excursion to the Baw Baw plateau in January last had, among its results, the addition of two species to the list of Victorian orchids.

"The visit to the Botanical Gardens on Saturday, 8th November, took the form of a social afternoon, in which over fifty members and friends participated, and, after a ramble through the gardens, the whole party sat down to afternoon tea as the guests of the committee. The outing was such an enjoyable one that it was suggested that the method of spending the afternoon was one which might be tried again.

"The thirtieth volume of the *Victorian Naturalist*, containing several illustrations and maps, has been published, and duly issued to members, &c. For reasons of economy the usual list of members has been omitted, but the names of those elected during the year will be found in the monthly proceedings.

"Again the Club's thanks are due to those executive officers who have devoted so much time to the Club's welfare, and particularly to Mr. F. G. A. Barnard, the honorary editor of the *Victorian Naturalist*.

"The Club has been actively engaged in the protection of bird-life where rare species were in danger of extermination in the search for plumes, skins, &c., for millinery purposes, and where the lives of insectivorous birds were endangered by

the laying of poison for the destruction of vermin. In the first case one notable event of the year has been the organizing, through the instrumentality of a number of bird-lovers, of a monster petition to the British Government, containing 17,000 signatures, protesting against the traffic in ornamental bird-skins and feathers, and in the case of insectivorous birds much has been done to minimize the evil, but the work is not yet complete.

"The Railway Commissioners have been reminded of their promise to keep certain stratigraphical exposures free from decorative vegetation for the purposes of instruction in geological formations, &c.

"The hon. treasurer's report will show that the balance in hand, £78 11s. 8d., at the 1st of May, 1913, has been reduced to £36 14s. 11d. at 30th April, 1914. This has been principally caused by the purchase of a bookcase and the increased cost of printing the Club's journal, owing to higher charges in the printing trade. The net receipts have been £166 2s. 3d., and expenditure £207 19s—net shortage, £41 16s. 9d., of which the bookcase accounts for £25 10s.

"The hon. librarian reports:—'During the past year 192 parts of the various journals to which the Club subscribes or receives in exchange were added to the library, in addition to various publications, proceedings, &c., from the Royal Societies of Australasia and the numerous publications of American museums and universities. Very little has been spent during the year on the purchase of new books, on account of the heavy expenditure incurred in purchasing the new bookcase. The number of borrowers is rather below the average, and special announcements should be made from time to time to induce members to make greater use of their library. About 30 complete volumes are ready for binding as soon as the Club's finances will permit of same. In addition to various maps received from the Mines Department during the year, Mr. A. D. Hardy, on behalf of the Forests Department, presented to the Club a map of Victoria showing forest reserves, &c., and Mr. Barnard a map of Melbourne and surrounding country within 50 miles radius. A donation to the Club's permanent exhibits was an enlarged photograph of young Blue Cranes in the nest, presented by Mr. M'Callum, of Colac. As it is impossible for every member to read each journal as it comes to hand, it might be to the Club's advantage and of assistance to the hon. editor if a sub-committee were appointed to review the monthly publications and publish in the *Naturalist* items and references of interest to members. Before closing, I must acknowledge the great assistance given on meeting nights by the hon. assistant librarian, Mr. J. G. O'Donoghue, who attended to the issue of books to members.'

“ Authors of papers, several of which were well illustrated with lantern views, leaders of excursions, exhibitors of specimens, and contributors of natural history notes are assured of the Club's gratitude for the trouble taken by them, and to Messrs. Coghill and Haughton your committee has again to express its indebtedness for the use of their offices at 79 Swanston-street for committee meetings.

“ Your committee concludes this report with an appeal to members to sustain and even increase that energetic prosecution of the Club's interests which has gained for our society the reputation that has been ours through the many years of the Club's existence, and thus help forward the good work in natural science generally and field observations in particular.

“ On behalf of the committee,

“ JAS. A. KERSHAW, *President.*

“ J. R. TOVEY, *Hon. Secretary.*

“ Melbourne, 27th May, 1914.”

FINANCIAL STATEMENT.

The hon. treasurer, Mr. G. Coghill, read the financial statement for 1913-14, which was as follows:—

RECEIPTS.				
To Balance, 30th April, 1913	...	...	...	£78 11 8
,, Subscriptions—				
Ordinary Members	...	£106 12 6		
Country Members	...	32 11 6		
Associates	...	1 7 6		
Juniors	...	1 1 0		
		—————	£141 12 6*	
,, <i>Victorian Naturalist</i> —				
Subscriptions and Sales	...	6 13 3		
Advertisements	...	6 15 0		
Reprints	...	7 12 3		
		—————	21 0 6	
,, Sales of Badges	...	...	0 6 3	
,, Interest, Savings Bank	...	...	3 3 0	
		—————	166 2 3	
			£244 13 11	

*Subscriptions:—Arrears, £29 18s. 6d.; 1913-14, £103 3s.; 1914-15, £8 11s.
—total £141 12s. 6d.

EXPENDITURE.

By <i>Victorian Naturalist</i> —				
Printing	...	£98 13 5		
Illustrating	...	15 9 9		
Free Reprints	...	7 4 3		
Reprints	...	4 14 3		
		—————	£126 1 8	
,, <i>Victorian Naturalist</i> —				
Wrapping and Posting	...	14 18 2		
,, Rooms—Rent and Attendance	...	13 10 0		
Carried forward	...	...	...	£154 9 10

Brought forward	...	...	...	...	£154 9 10
By Library—Bookcase	...	25	10	0	
Books	...	0	19	5	
Periodicals	...	5	15	0	
Insurance and Postage	1	5	6		
					33 9 11
,, Hire of Lantern, &c.	...	...	...	3	17 6
,, Printing and Stationery	...	...	8	5	6
,, Postages, &c.	...	...	4	12	2
,, Advertising, Bank Charge, &c.	...	...	0	18	3
,, Expenses Wild-flower Exhibition	...	2	5	10	
					£207 19 0
,, Balance in Savings Bank	...	...	30	12	10
,, , , London Bank	...	...	6	2	1
					36 14 11
					£244 13 11

G. COGHILL, *Hon. Treasurer.*

21st May, 1914.

Audited and found correct.

28th May, 1914.

JOHN STICKLAND, }
JOHN WILCOX, } *Auditors.*

The following statement of assets and liabilities was also read:—

ASSETS.					
Balance—Savings Bank	...	...	...	£30	12 10
,, London Bank	...	...	...	6	2 1
					£36 14 11
Arrears of Subscriptions (£40), say...	...	...	...	33	0 0
Badges on hand	...	...	...	1	2 9
Library and Furniture (Insurance Value)	...	...	...	150	0 0
					£220 17 8
LIABILITIES.					
Subscriptions paid in advance	...	...	...	£8	11 0

In the discussion which followed the reading of the report Mr. Best said the Club's finances showed a loss of £17 for the year. Various causes were assigned for the loss, the chief being the extra cost of printing the Club's journal. He thought that if tenders were invited a saving in the cost of printing would result. He was opposed to the procedure of supplying associates with the journal for the sum of 2s. 6d. per annum.

Mr. Hardy signified himself as in accord with the Club's procedure in regard to the associates, and thought it advisable to increase the yearly subscription for ordinary members from 15s. to 20s.

Dr. Sutton said that in his opinion the journal should be made more attractive to outsiders. By this means a better circulation, with its accruing advantages, would be gained. He suggested that a sub-committee be formed to go into the matter.

On the motion of Messrs. O. Rosenhain and F. Pitcher, the report and statement were adopted.

ELECTION OF OFFICE-BEARERS.

There being no other nominations, the following office-bearers were duly elected:—President, Mr. J. A. Kershaw, F.E.S.; vice-presidents, Dr. C. S. Sutton and Mr. F. Pitcher; hon. treasurer, Mr. G. Coghill; hon. librarian, Mr. W. G. Mackintosh; hon. editor, Mr. F. G. A. Barnard; hon. secretary, Mr. J. G. O'Donoghue; hon. assistant secretary and librarian, Mr. H. Whitty.

On a ballot being taken for five members of the committee, the following were duly elected:—Messrs. F. Chapman, A.L.S., J. Gabriel, A. D. Hardy, F.L.S., J. Searle, and P. R. H. St. John.

Mr. F. G. A. Barnard moved a vote of thanks to Mr. J. R. Tovey for his services to the Club during his term of office as hon. secretary. The president said that Mr. Tovey had performed his duties conscientiously, and during the past year had devoted a great deal of time to the Club's interests. The motion was carried by acclamation.

On the motion of Mr. D. Best, a hearty vote of thanks was accorded to the retiring office-bearers and auditors.

PAPER.

Owing to the lateness of the hour, Mr. R. A. Bastow's paper on Victorian Hepaticæ was held over till the next ordinary meeting of the Club.

SPECIAL APPEAL FOR EXHIBITS.

Mr. C. J. Gabriel drew attention to the paucity of the exhibits at the meetings, and expressed an opinion that an effort should be made to induce the members to take more interest in the monthly exhibitions of specimens.

The President expressed himself in accord with Mr. Gabriel's views, and urged members to say something relative to their exhibits, and thereby cause members to examine them after the adjournment.

Mr. F. Pitcher suggested that, instead of the secretary, each exhibitor should read out the particulars of his or her exhibit.

Mr. Barrett said he was in favour of a special appeal being made to members to exhibit specimens.

NATURAL HISTORY NOTES.

Mr. H. W. Davey, F.E.S., forwarded a note regarding maternal instinct exhibited by a beetle, *Notonomus chalybeus* (Carabidae). He said it seems strange to find evidence of the maternal instinct to protect its young among such predatory creatures as centipedes, scorpions, and some carab beetles. In the first and second groups the maternal instinct is well shown, but not nearly so frequently with beetles. In May last, when in the Apollo Bay and Beech Forest district, he was turning over old rails and logs, under which it was almost certain to find a female *Notonomus chalybeus*, Dej., sitting over a small hollow dug out of the ground, and in which about

twenty small, greyish eggs had been deposited. Later on these hatch into curious parti-coloured larvæ, which are clustered together in the same manner as young scorpions, but unlike in the respect that they do not cling to their mother's body. If the beetle be removed the larvæ at once separate and seek other shelter. The reason for this attention may be to protect the eggs or young from the male beetle, which is generally present under the same log.

Mr. D. Le Souëf, C.M.Z.S., forwarded a note stating that a pair of Lyre-birds, *Menura superba*, caught in the neighbourhood of Sydney, N.S.W., are doing very well at the Melbourne Zoological Gardens. They are last year's birds, and therefore the male has not yet got the adult tail, but some of the feathers are showing. They have become very tame, and will feed out of one's hands.

Mr. C. French contributed a note with reference to the English Skylark, which in some districts is becoming a nuisance to the market gardeners by destroying young plants of cabbages, &c.

Mr. H. Whitmore read a newspaper paragraph recording the finding of the remains of an opossum completely enclosed in wax, in a hive of wild bees. Mr. A. D. Hardy said that he had heard of a similar case.

EXHIBITS.

By Mr. R. A. Bastow.—Victorian Hepaticæ (Liverworts), in illustration of his postponed paper.

By Mr. F. Pitcher.—Blooms of *Buckinghamia celsissima*, F. v. M., Ivory Curl-flower, Queensland; *Hakea verrucosa*, F. v. M., Warty-fruited Hakea, and *H. cristata*, R. Br., Crested Hakea, both from Western Australia; also berried specimens of *Eugenia Smithii*, Poiret, "Lilly-pilly," Victoria, New South Wales, &c., and *E. cyanocarpa*, F. v. M., "Blue-fruited Myrtle," New South Wales—all grown in Botanic Gardens, Melbourne.

By Mr. P. R. H. St. John.—Herbarium specimens in various stages of *Eucalyptus cinerea*, F. v. M., var. *multiflora*, J. H. Maiden, collected by exhibitor in Bayswater district, 6th June, 1914.

By Dr. C. S. Sutton.—Orchid, *Pterostylis reflexa*, R. Br., collected by exhibitor on the Silurian formation west of Whittlesea, 25th April, 1914.

By Mr. J. Searle.—A rare Entomostracan, *Daphnia lumholtzi*, Sars., only taken two or three times in Victoria, recorded also from Queensland, Central Africa, and Western Asia. Exhibited by exhibitor some two years ago, but then unnamed.

After the usual conversazione the meeting terminated.

REPTILES OF FLINDERS ISLAND.

To the Editor of the Victorian Naturalist.

SIR,—In the June number of the *Victorian Naturalist* Mr. F. R. Zietz, of the South Australian Museum, discusses the distribution of the four species he records, and says of *Tiliqua nigrolutea* that it has been "previously recorded from South Australia and Tasmania." If he means southern Australia he is correct, for it is well known in Victoria, and passes up for some distance into New South Wales. The record was made by M'Coy, Lucas and Frost, and Lucas and Le Souëf. As there are some peculiar relationships between the faunas of Kangaroo Island and the islands of Bass Strait, the record as given by Mr. Zietz needs amplifying, or it may give rise to a mistaken idea.

Exact records made by a competent zoologist like Mr. Zietz are, I need hardly say, of value, and we welcome his appearance in our journal, and will look for many more notes from him.—I am, &c.,

T. S. HALL.

University, 21/6/14.

G. W. SLEEPER'S ANTICIPATION OF DARWINISM.

To the Editor of the Victorian Naturalist.

SIR,—In the *Victorian Naturalist* of March last (page 193) there appeared a reference, which I made at the February meeting of the Field Naturalists' Club, to the presidential address by Professor Poulton to the members of the Linnean Society of London, in which he dealt with the discovery of a pamphlet, dated 1849, containing alleged lectures by George W. Sleeper, of Boston, and containing ideas which, if the pamphlet proved to be genuine, anticipated Darwinism in many respects. The print was subjected to much close scrutiny, and both Dr. A. Russel Wallace, who sent it to the Linnean Society, and Professor Poulton, with other experts in typography and paper manufacture, &c., appeared to think that it was genuine. In his search for biographical details, Professor Poulton had established communication with Sleeper's son, and in concluding he promised a further reference to this remarkable publication after he had made fuller inquiries.

According to the *Times* of 29th May, 1914 (weekly edition) just to hand, the matter has again formed the subject of the presidential address. It seems that inquiries made during the interval have resulted in evidence that has caused Professor Poulton at the last annual meeting to express his disbelief in its authenticity. He said:—

"The evidence now brought forward would probably lead the scientific and literary world to an undisputed conclusion—that the work was a fraud . . . that Sleeper probably quite honestly believed that the vague ideas that occurred to him were of momentous importance in the history of science, and that when he had put the results of his reading in his own words he was announcing original

discoveries. . . . Self-deceived as to the importance of his own ideas, he would certainly honestly believe that he had been, and still was, the victim of bitter injustice, and he might defend the falsification of evidence on the ground that only in this way could justice be done, not only to himself, but to the history of thought. The forgeries were either Sleeper's or by someone who shared his feelings."

For further information as to this remarkable addition to the history of the idea of evolution, &c., members should consult the *Proceedings of the Linnean Society of London*, presidential addresses for the last and present years.—A. D. HARDY. Kew, 2/7/14.

THE ENGLISH SKYLARK AS A GARDEN PEST.—It will be news to many to learn that the English Skylark, *Alauda arvensis*, is in some districts becoming a serious menace to market gardeners. This bird was introduced into Australia by the Royal Zoological and Acclimatization Society of Victoria in 1863, when a number were liberated in the vicinity of Melbourne. In 1867 eighty birds were liberated, further numbers in 1870 and 1872, and about one hundred in 1873-4. In 1870 a number were liberated near Sydney. About Melbourne they have increased considerably, and may usually be heard about Fisherman's Bend, the heath grounds of Brighton, &c. During the last few months the Skylarks have been greatly in evidence, especially in the Carrum, Mentone, and Cheltenham districts. There these birds have been causing considerable annoyance and loss to market gardeners and others by the manner in which they have been destroying the young seedlings and plants of cabbages, cauliflowers, turnips, and lettuces. Recently I visited the garden of a well-known market gardener residing near Mentone, and was surprised to see numbers of these birds busily engaged among the vegetable seed-beds. On examining these beds I found that row after row of seeds and seedling vegetable plants, also young cabbage plants that had been planted out, had been eaten. I requested the owners to shoot a few of the birds for examination purposes. Three birds were shot, and on examination their crops were found to contain cabbage and turnip seeds, young cabbage and radish leaves, gravel, but no insects whatever. The owners of the garden informed me that numbers of the birds had been destroyed by means of poisoned wheat. I also examined the crops of several of these, and the result was the same in every instance. Their crops were full of vegetable seeds and vegetable matter, not a solitary insect being found in any of them. If food was scarce, I could understand these birds attacking vegetable crops, but at the present time insects are plentiful, this being an unusually favourable season for them.—C. FRENCH, JUN., Government Entomologist. 4th June, 1914.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary meeting of the Club was held at the Royal Society's Hall on Monday evening, 13th July, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 35 members were present.

CORRESPONDENCE.

From Mr. D. Le Souëf, C.M.Z.S., Director of Zoological Gardens, Melbourne, in reply to the hon. secretary's inquiry, stating that he was pleased the Tasmanian people intended making an effort to introduce the Lyre-bird into their State, and expressing an opinion that the probable cost of trapping birds would be about £5 per pair. The necessary food the birds would need before being set at liberty could be supplied from the Gardens. The transportation charges, he thought, would be nominal.

For the information of those present, the hon. secretary explained that at the last meeting of the committee a communication was read from Mr. H. Stuart Dove, West Devonport, Tasmania, soliciting the co-operation of the Club in securing several pairs of the Victoria Lyre-bird for liberating in the reserves adjacent to Mount Wellington, Tasmania. Before taking definite action in the matter the committee had thought it advisable to solicit Mr. Le Souëf's opinion respecting the probable cost of trapping and transporting the birds.

It was resolved that the hon. secretary write to Mr. Dove, furnish him with the information obtained from Mr. Le Souëf, and ascertain the number of birds required, and the probable amount of money that would be subscribed to defray expenses.

REPORTS.

A report of the excursion to Evelyn on Saturday, 11th July, was given by the leader, Mr. F. Pitcher. Contrary to expectations, the excursion was well attended, a party of eleven members (including four ladies) taking part. On arriving at Evelyn at 2 p.m. a start was at once made for the Olinda Creek, where lunch was partaken. Prior to quitting the creek for collecting purposes, a few remarks were made on the characteristics that differentiated our so-called "native heaths," which belong to the natural order Epacridæ, from the true heaths, N.O. Ericaceæ, of the Old World. Though too early for wild-flowers, the pink and white *Epacris impressa* abounded, and large bunches were gathered. Along the Lilydale water-supply channel various ferns were noted, chief being *Lomaria*

discolor and *L. capensis* and *Davallia dubia*. The interesting locality to the south of Evelyn will soon cease to be possessed of attraction for those botanically inclined, as large areas have been cut up for building sites, and numbers of "week-end" dwellings are being erected to the usual accompaniment—the destruction of native trees, shrubs, and other vegetation. A special feature of interest in the journey to Evelyn was the number of trees of *Acacia Baileyana*, in profuse bloom, that were to be seen in private gardens on either side of the railway line. Though mid-winter, the afternoon proved a pleasant one, resulting in a very enjoyable outing.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Dorothy Coleman, "Walsham," Blackburn, was duly elected as an associate.

GENERAL BUSINESS.

Mr. O. Rosenhain said that, in accordance with the resolution passed at the annual meeting of the Club on 15th June, he had interviewed Major Semmens respecting the granting of permits to destroy Black Swans on The Heart estate, near Sale. The inspector stated the birds had increased to an enormous extent during the past few years, and were to be seen at the locality mentioned in thousands. Letters had been received by him from settlers in the district complaining of the damage done to their grass by large flocks of these birds. The police had made inquiries, and their reports fully confirmed the genuineness of the land-owners' complaints. He had intimated that he would, on application being made, grant a permit to any aggrieved settler to destroy swans on his property. So far no permits had been applied for. In the event of permits being granted the police would be instructed to prevent wanton destruction.

Mr. Rosenhain expressed himself as being satisfied that The Heart settlers had a just complaint, and were entitled to some measure of protection from the depredations of the Black Swans.

Mr. G. A. Keartland said that he had noted large flocks, comprising thousands of birds, in The Heart district in March last.

Mr. J. Gabriel expressed the opinion that the dry season, by drying up the lagoons and swamps and so reducing the area of those sheets of water frequented by the swans, had contributed, to a great extent, to the congregation of the birds in the Sale district.

REMARKS BY EXHIBITORS OF SPECIMENS.

Arising out of some remarks by Mr. C. J. Gabriel at the thirty-fourth annual meeting of the Club on 15th June respecting

the lack of information furnished by exhibitors relative to their specimens, the committee decided to adopt the procedure outlined in the July issue of the journal, and made a special appeal to members both for exhibits and remarks.

Mr. J. Searle, referring to his exhibit of *Sagitta*, or "arrow worms," said:—"The *Sagitta*, or 'arrow worms,' as they are called in Europe, are familiar objects to our local fishermen, who call them 'needles' when they find them in abundance in the meshes of their nets. They are spindle-shaped, elongated, and extremely transparent animals, and measure up to an inch in length. Though they have fins on the upper and lower edges of the body, and also possess a tail, these are not used for the purpose of locomotion, serving perhaps as balancers or rudders, or, maybe, to help to keep the little animals from sinking; they swim by muscular movements of the whole body. The *Sagitta* are hermaphrodite, the female organs being situated in the trunk of the body, the male in the tail part. The eggs, laid in the water, are pelagic, and float near the surface of the sea. The young, when hatched from the egg, already resemble the adult in shape, though they are, of course, extremely small; there is no larval stage in their development. Their food consists of diatoms, infusoria, and other small pelagic creatures. They are found in the seas of the world. Their place in the scheme of classification is among the Annelida, and they, with the allied genus *Spadella*, form the class *Chætopnatha*, so called from the hair-like bristles that surround the mouth parts. The specimens exhibited were taken at night in a tow net off St. Kilda pier."

Mr. A. L. Scott drew attention to his exhibit of New Zealand kauri gum, three kinds—clear, cloudy, and sugary. This gum, he said, may be termed a sub-fossil product, for it is dug out of the ground. It is supposed to have originated through forests in the past ages having been destroyed by fire, the gum melting and flowing into the porous soil. It is a near relative to amber. The basalt specimen with the crystal-lined cavity, so suggestive of a fairy cave, was obtained from the Brunswick municipal quarries.

Mr. F. Chapman, speaking in reference to his exhibit of a vertical section of the cutting tooth of *Chrysophris*, or Sea Bream, shown under the microscope, said:—"As here shown under a moderate power magnification, the base of the tooth consists of coarsely tabulated dentine, although not sufficiently vascular to merit the name vaso-dentine. This is surmounted by a true dental layer filled with very fine branching tubules, whilst covering the outer surface is a thin, but hard and brilliant, layer of enamel. A curious feature of this tooth is the continuity of the dentinal tubules into the enamel, entering as simple or unbranched tubes. A similar structure

is seen in the teeth of most marsupials, and in a few higher mammals, as the Hyrax, the Jerboa, and some shrews."

Mr. J. A. Kershaw, F.E.S., referring to the exhibit, on behalf of the National Museum, of specimens of the Dormouse Phalanger, *Dromicia concinna*, from Ouyen, N.W. Victoria, and Purnong, South Australia, said that the species is a Western Australian one, and had not, so far as he knew, been recorded for Victoria before. He also drew attention to a very large and complete example of the silken shelter-bag constructed by the larvæ of the Processionary Moth, *Teara contraria*. This had been found on a gum-tree at Bolga, near Tallangatta, Victoria.

Mr. H. Witty called attention to a fine range of varieties of the British land-shells *Helix nemoralis* and *Helix hortensis*, many of which were entirely devoid of markings, whilst others were strongly marked. These snails are quite common in many parts of the British Isles, and very few species vary so much as these particular ones. He also drew attention to a fine series of Lumière autochrome lantern slides in natural colours taken by Dr. H. G. Drake-Brockman, F.R.P.S., of Middlesborough, England, one of the leading photographers in colour process. The slides included Narcissus, Red Admiral Butterfly, Spurge Hawk Moth, American Io Moth, Camellias (red and white), larvæ of Oak Eggar Moth, Emperor Moth, and a photograph of a lady, all true to life. He mentioned the enormous possibilities of colour photography for commercial purposes, and stated that in his opinion no process could be compared to the Lumière.

PAPERS.

1. By Mr. R. A. Bastow, entitled "Victorian Hepaticæ (Liverworts)."

The author, in a very interesting and instructive manner, dealt with this beautiful natural order of cryptogamic plants, and by means of a well-executed series of blackboard drawings, illustrating the various types referred to in his paper, pointed out the chief distinguishing characteristic feature of each. He said that the literature on Hepaticæ is neither voluminous nor very accessible, and those desirous of pursuing the study of this group in Victoria have to depend on British and Continental writers for information.

Mr. G. Coghill, in complimenting the author on his paper, which, when published, will be an excellent guide for students of these lowly plants, read a note from Mr. T. S. Hart, B.Sc., Forests School, Creswick, wherein he mentioned the circumstance of a Riccia, probably *R. natans*, being very abundant last year on the surface of the back-waters of Lake Wendouree, Ballarat.

2. By Messrs. J. H. Gatliff and C. J. Gabriel, entitled "Alterations in the Nomenclature of Some Victorian Marine Mollusca."

The paper, being purely of a technical nature, was not productive of discussion. Whilst expressing their regret at the combination of circumstances necessitating an alteration in the names of nine species of shells found on our coast, the authors intimated their willingness to bow to the law of priority.

NATURAL HISTORY NOTES.

Mr. G. A. Keartland stated that, at the inception of the quail season, he succeeded in securing unhurt a specimen of the ordinary Stubble Quail, *Coturnix pectoralis*, Gld., which he placed in a cage tenanted by a male and female finch. The former died, and the female immediately chummed up with the quail. After some time he found a mate for both, but the female finch still cherishes her attachment for her former chum. It appeared strange to him that a perching bird, such as the finch, should adapt itself, in so short a time, to the ground habit of the quail.

The president, Mr. J. A. Kershaw, instanced a parallel case.

Mr. T. S. Hart, writing from Creswick, stated that the "heath," *Epacris impressa*, in that locality seemed poor and late, and that plants occupying a south-westerly aspect appeared to present a far better appearance than on other situations. Many plants were to be noted with dead tips, as if growth had been promoted by conditions which, though favourable, were not of long duration.

EXHIBITS.

By Mr. R. A. Bastow.—A collection of Victorian Liverworts, in illustration of his paper.

By Mr. F. Chapman.—A vertical section of the conical cutting tooth of Chrysophrys, or Sea Bream, shown under the microscope.

By Mr. C. French, jun.—An abnormal flower of the Arum Lily, *Richardia Africana*.

By Messrs. J. H. Gatliff and C. J. Gabriel.—Marine shells in illustration of their paper.

By Mr. J. A. Kershaw.—Dormouse phalanger, *Dromicius concinna*, in spirit; also a shelter bag of the larvae of the Processionary Moth, from Bolga.

By Mr. A. L. Scott.—Specimen of basalt with crystal-lined cavity, from municipal quarries, Brunswick; also three varieties of New Zealand kauri gum.

By Mr. J. Searle.—Sagitta, or "arrow worms," taken at night in a tow net off St. Kilda pier.

By Mr. H. Witty.—Specimens of varieties of the British land snail, *Helix nemoralis* and *Helix hortensis*; also several Lumière autochromes in natural colours, by Dr. H. G. Drake Brockman, F.R.P.S., Eng.

After the usual conversazione the meeting terminated.

PLANT DISTRIBUTION IN THE HEALESVILLE DISTRICT.

BY REGINALD KELLY.

(Read before the Field Naturalists' Club of Victoria, 20th April, 1914.)

THE Healesville district is so well known as a tourist resort to the majority of the members of this Club that little need be said as to its position or characteristics; but, as the *Naturalist* has readers outside the limits of this State, it will be necessary to briefly refer to the main features of the district. The area to which I propose to refer covers about 150 square miles, and may be roughly defined as bounded by a line drawn from Toolangi (about 10 miles northwest of the township of Healesville) to the Blacks' Spur, thence to Mount Donna Buang, west to the Yarra, along that stream to the railway tunnel, then north to Toolangi. The details of this area can be readily seen on a large scale map, such as that recently issued by the Lands Department for the use of tourists.

Healesville, about 40 miles almost due east of Melbourne, is surrounded on its northern, eastern, and southern sides by ranges of hills varying from 700 to 4,000 feet above sea-level, the township itself being situated on the banks of the Watts River, about 270 feet above sea-level. To the west are the extensive flats stretching towards Yarra Glen, through which the Yarra meanders, and which in winter are often submerged and appear like a huge lake. The district is a well-watered one, permanent streams occurring in every direction. The lower part of the area was apparently at one time under land-locked water, which was banked back into the present mountain gullies, and formed arms or inlets like those of Lake Tyers, or, in miniature, Sydney Harbour. The water was supplied by the heavy rainfall in the mountains now included in the water reserve under the control of the Metropolitan Board of Works, and which formed the watershed of the Yarra and Watts rivers. These rivers, instead of having an outlet from the Healesville basin, close to their confluence near the railway tunnel, were probably there blocked by a range of hills, and, indeed, did not exist nearer than those points where they fed the lake at a level corresponding to the lowest point on the confining range of hills. In course of time the lake disappeared, from two causes—erosion at the present outlet and silt deposit in the lake itself. On the high banks of the gap through which the Yarra now flows, on the west side of the town, can still be seen wave marks, and similar signs are observable also on the sides of many of the promontories. Rock formations are exposed on both north and south banks at this spot, though not directly opposite. It is conceivable

that the point of issue was like the lip of a basin, at which the lake, when in flood, overflowed—probably into another lake covering the Yarra flats below. The wearing away of the soft rock was inevitable, and left a depression like the waist of an hour-glass, through which the Yarra now flows. As this opening was wearing the bed of the lake was filling up, until the water was so shallow that, seeking levels, it cut channels in the mud, forming river-beds which changed from time to time as various obstacles blocked the course, or the level varied. The lake is now often partly reproduced at time of flood. The old river-beds, still plainly observable on the flats in the form of depressions and billabongs, are first filled up; then the waters, spreading, often reach the old shores and there lap and recede as they did of yore on a much greater scale. As the waters receded vegetation appeared.

The course of vegetative progress may be roughly recast by examining the growths in the present streams and the various billabongs and branches in ascending order from those with permanent water to practically dry beds, proceeding from plankton to benthos. Series after series of unicellular and unattached multicellular plants, fresh-water algae, and mosses which grow on stones in the running water in the upper feeders, such as *Fissidens rigidulus* and the wet-ground moss, *Rynchosstegium muriculatum*, were probably among the first forms. In the side washes of the lake, that at low water were still, grew *Potamogeton*, *Lemna* (Duckweed), and in the shallower moving water the long trails of *Triglochin procera*, with *Ottelia* and *Vallisneria*, which adjust themselves to varying depths. As the water found an outlet and gradually subsided, associations of *Myriophyllum variifolium* and various *Ranunculi* appeared, with *Typheta* of *Typha angustifolia* and the pan-phyton *Arundo phragmites*—forms, some of them wide apart in evolution, but the ready representatives of an existent flora. The habit of the yellow-flowered gentian, *Limnanthemum exaltatum*, is peculiar, in that it does not form a part of, but has risen superior to, the *Limnea* formation, and occupies—sometimes almost entirely by itself—isolated small indentations, which may be permanent pools or merely moist saucers. As the waters still further receded, raised portions of the old bed became comparatively dry land, and were strewn by seeds from all sides, many of which found suitable soil and environment. Thus were formed, in addition to the *Typheta*, *Junceta* and *Scirpetia* in the remaining swamps, whilst the drier parts selected such portions of the invading flora as were adaptable. All these portions have since received into their formations and associations a large number of acclimatized and naturalized aliens. Some small swamps along the railway line are almost wholly tenanted by exotic mint, *Mentha pulegium*, Pennyroyal.

The upper story of vegetation is entirely eucalyptian, and the first sub-story is, in the main, the same, but in association at various points with the tallest acacias, *Atherosperma*, and *Fagus*. Most of the high land is covered with a series of open associations, except in such spots as have been cleared or cultivated, and there with close associations of the lowest stories only. In other words, it is heavily timbered, with thick undergrowth, and known as bushland and forest formation, with its usual complementaries—moss and lichen, tundra, and dwarf shrub heath.

Distribution of Eucalypts.—*Eucalyptus coriacea* is found outside the area under review, its range being limited to the undulating ground between Yering and the Tarrawarra station. The trees are much scattered, evidently many having been destroyed in clearing. They favour the Silurian knolls surmounting the Yarra flats, and avoiding the alluvial deposit. These knolls were possibly islands in, or banks of, a lower lake formed when the Yarra waters were dammed back. Under present conditions the trees grow above flood-level. They do not extend as far back as the railway tunnel, and do not appear at all beyond it. The accompanying allies of the lower country, *E. rubida*, *E. viminalis*, and *E. Gunnii*, persist beyond this point. The first-named seeks the higher level of the foot-hills and spreads out on the rises to about 300 feet above sea-level, and ends beyond the town at this height, and gives place then in the *Leiophloia* to *E. goniocalyx*. *E. viminalis*, superficially so like *E. rubida*, but so different in timber and the later juvenile, adolescent, and recurrent foliage, follows the river banks, keeping mostly to the alluvial flats and valleys, grows to a great height, and shows but little of the rugged bark and stunted conformation of its seaboard variety. *E. Gunnii* has much the same distribution, but usually grows away from the main stream and spreads farther afield, but always keeps to lower ground than *E. rubida*, choosing the more acid and slightly higher flats. A corresponding difference of distribution is found in the three acacias, *dealbata*, *mollissima*, and *melanoxyton*. The first-named follows the rivers, the second is distributed similarly to *E. rubida*, whilst *A. melanoxyton* follows the lines of both *E. Gunnii* and *E. viminalis*, but continues to greater altitudes. As with the three eucalypts, these three acacias are in association at the Melbourne end of the tunnel, but all diverge to their various altitudes from that point.

The distribution and form of the Apple Gum, *Eucalyptus Sturtiana*, is most interesting. Taking as the type those trees that grow near Ringwood and Croydon, with large juvenile leaves, and similar ones covered with a glaucous bloom that

spring from suckers and fractures—trees that, when older, are umbrageous, whose mature leaves are leathery, somewhat lanceolar, and whose branches put out at the tips new leaves, soft, narrow, and beautifully coloured with tints of blue and purple—*Eucalyptus Stuartiana* of that type gradually disappears and is lost at Christmas Hills and at Lilydale, where the railway turns to the Yarra flats; the species is picked up again, not recognizable at a glance, on the rising ground near Healesville. Only an occasional glaucous leaf or bunch of leaves betrays it. The foliage is more of the *viminalis* type, the seed-cases fewer, the bark cleaner, the wood softer, and cutting (in the sapling stage) like cheese. A connecting link is found in the elfin forms on the Chum Creek slopes. Here dwarf, gnarled, crooked trees show the external features of bark, leaves, and fruit, and the gradual variation can be traced in from the foot of Toolangi Hill, where it may be confused with *E. dives*, to similar heights around Healesville, branching out to Myers' Creek and over to the Coranderrk and Don roads, and penetrating in wedge-shaped distribution to the foot of Mount Riddell, but never ascending to greater heights than about 600 feet. If you take a branch of one of the trees in the Healesville area and place it alongside one taken at Croydon, it is hard to believe they belong to the one species; but, by placing side by side pieces gathered over the tract described, the links are obvious and the identity undoubted. This variation all occurs within a direct line of 20 miles. The Croydon type is thickly fruited even on small bushes. On the Healesville form it is sometimes difficult to find one fruit except on old trees. The Chum Creek link is fruited and leaved midway between the two descriptions.

The narrow-leaved Peppermint Gum, *Eucalyptus amygdalina*, is plentiful and evenly distributed within and without the area; within it varies considerably—from the broad-leaved type to the “variety *microphylla*.” In the former the leaves are broad, the fruits sparsely clustered, and the bark cleaner in colour. In the latter the bark is dark, the leaves very narrow, and the fruit in thick, fan-like clusters. These two forms are shrubby, and locally known as white and black peppermint. The latter features are those of the intermediate or normal type—a compromise between the two extremes. This median form ascends to the highest ranges, and grows there as a very tall timber tree side by side with *E. regnans*, another species from which it is so distinct that one cannot conceive that the late Baron von Mueller, when he called both of them *E. amygdalina*, could ever have seen them growing in company, but identified them by herbarium specimens only. He must have got a shock when he saw what he had done, both with his

black and white *amygdalinas* and his black and white *leucoxylons*. "By their fruits ye shall know them"—and sometimes be misled. The best contrasts between the tall *amygdalina* and *regnans* are to be observed near Narbethong.

Eucalyptus obliqua is veritably a messmate to all those mentioned, being found in association with them, and usually the dominant partner, from the lowest to the highest ground. It is found on the river banks, sometimes hanging over the water in almost willow-like form, and at the tops of the mountains as a straight-trunked, magnificent timber tree. It is most luxuriant at mid-distances on the mountain slopes, its height being practically in proportion to altitude of situation, its straightness, as would be expected, in just ratio to closeness of growth and advantage of moisture and soil. *E. macrorrhyncha*, the true stringybark, is found in the clay-stone lower hillsides in company with the mid-forms of messmate and peppermint. It is fast disappearing, as, growing in unreserved country, it has been ruthlessly cut down for its general utility, and is a shy reproducer, though it seeds plentifully. *Eucalyptus eleophora*, or *E. Cambagei*, D. and M., the local "bastard box" of the bushmen, is found usually in association with *E. Stuartiana*, and is the lowland variation of the highland *E. goniocalyx*, which is here called "blue gum," and sold for timber under that name.

The upper branches of this first story form the first break or resistance to the rainfall so necessary in the watershed of the territory reserved for conservation of the water supply for the city of Melbourne. It is well understood that if this story were destroyed, or even reduced, the reserve, as a collecting area for water, would be proportionately less valuable. At this upper plane of the vegetation the force of downpour is partially broken. The shorter trees of this story receive in many of the gaps their share, both stages steadyng the fall on the denser leaf-surface of the second story.

This, in the water reserve, consists of smaller trees and shrubs of a considerable number of genera and species. Some of these genera are botanically far apart but close in association. In parts, particularly the gullies and their slopes, the roof of this story is mainly formed of the large fronds of the tree-ferns *Dicksonia Billardieri* and *Alsophila australis*. It is an uneven and sloping roof, for not only do these tree-ferns vary much in height, but so also do the other components of the story—not only between the species, but amongst themselves. The advantage of this variety of growth is manifold. It is of incalculable advantage on steep hillsides, where the trees of the lower parts, nourished by moisture, grow higher, and form a series of compact surfaces or corymbs springing from

the earth, meeting side-blown rains with an almost unbroken front and a vertical downpour with a fully graduated series of steps from which the heaviest storm-waters can only drip to the lowest stratum.

The trees forming the lower division of the upper story and graduating to the second story consist mainly of Sassafras, *Atherospermum moschatum*, Myrtle Beech, *Fagus Cunninghamii*, and the rarer Native Olive, *Notelaea ligustrina*, which are restricted to the highest gullies and sources of streams. The Blackwood, *Acacia melanoxylon*, and Silver Wattle, *A. dealbata*, are found in company with the former three, but are not similarly restricted. They descend to the lowest flats of the area and beyond it, as also does the Sweet Bursaria, *Bursaria spinosa*. *Hedycarya Cunninghamii*, *Pomaderris apetala*, *Senecio Bedfordii*, *Prostanthera lasiantha*, and *Coprosma Billardieri* occupy both the high position and follow the rivers to lower levels. *Coprosma hirtella* favours higher gullies and rocky hillsides.

The Lomatias, *L. Fraseri* and *L. longifolia*, are denizens of the highest gullies, but the former disperses laterally to the hillsides; the latter goes downward with the streams. *L. ilicifolia* occupies drier sites on the hillside, and is more shrubby and prostrate. *Myrsine variabilis* is an occasional shrub, almost solitary as a species, but associated with other genera in its incidental occurrence from the heights down the river bank. *Banksia Collina* is endemic on low ranges towards the head of the Chum Creek and on the stony ranges near the Yarra towards Lauching Place, the extreme north and south of the area. In the Chum Creek habitat it is associated with the endemic *Grevillea repens* and *Oxylobium procumbens*—plants of the ground floor. *Pittosporum bicolor* is an occasional shrub found mainly on Myers Creek, Condon's Gully, Mathinna Falls, and upper gullies and stream sources of the water reserve.

In these ranges are several kinds of acacias. On the highest tops, notably Mount St. Leonard and Mount Juliet, is the distinct *Acacia penninervis*—never found on the lower levels, and rarely on the lesser heights. As a genus *Acacia* is ubiquitous, its species varying from the highest mountain tops to the plains beyond. The principal mountain gully kinds are *A. melanoxylon*, *A. dealbata*, trees; *A. leprosa*, *A. stricta*, *A. verticillata*, *A. linearis*, and *A. oxycedrus*, shrubs; but these, with many other species, are found also at lower levels. One isolated patch of *A. vomeriformis* appears on the hillside at the south of the town, but this is fast disappearing, and the individual plants degenerating. *Acacia juniperina* grows in two places—along Chum Creek road and on the upper road-

side just beyond the cemetery; but the allied species, *Acacia diffusa*, flourishes in several places, particularly in patches scattered on the lower clay hills, and openly distributed on the rises between the Chum and Myers Creeks before they junction. Singularly, the only proclaimed acacia, *A. armata*, is very rare, though hedges of it thrive on the Yarra flats; there is only one bush near the railway tunnel and a couple together in the Melbourne and Metropolitan Board of Works channel reserve, just where the aqueduct crosses the Long Gully road. The two occurrences are over two miles apart, on practically the same range, on the west side of the area, and both where earthworks have been carried out.

Of the other acacias, it is noted that *A. stricta* is found in several patches at about the same height, particularly at the railway tunnel, where it takes duty as a chasmophyte and luxuriates as a secondary rock covering. When with *Acacia leprosa* it is the dominant partner. Of *A. verniciflua* there was only one bush seen, in a paddock off the Chum Creek road, near the Board of Works tunnel. This has been destroyed by fire. A specimen of *A. retinodes* was brought to me from near the Badger Creek State school, and said to be from a solitary plant, which I have not been able to find there, nor any other in the district, and presume that one has been destroyed. *A. penninervis* grows freely on Blacks' Spur, Mount Juliet, Mount St. Leonard, and from Toolangi down to the *Grevillea repens* patch, where it is stunted. *A. pravissima* is said to grow out of the area, beyond the Spur. *A. myrtifolia* does not approach nearer than the Lilydale-Wandin district. *A. melanoxylon*, Blackwood, flourishes all over the locality as a tall tree on the highest mountains and deep gullies, but smaller on the lower ones. A particularly fine group may be seen near the crossing of the Badger, on the Don road. *A. oxycedrus* forms a belt from the Graceburn Creek following the pipe track to the Maroondah Weir, and is also part of the dense undergrowth skirting the Fernshaw road. *A. linearis* forms the dense scrub on the lesser hillsides and gullies, and is usually predominant. It sends forth plentiful suckers and adventitious shoots, often forming a tangle with *Erharta juncea*, *Comesperma volubile*, and the dodders. After the most severe fire it springs up green from the roots as quickly and freely as bracken. *Acacia verticillata* is a part of the general formation, mountain, hill, and gully, but rarely on the flat. *Leptospermum lanigerum* associates with *Kunzea peduncularis* on the Yarra, and continues to fringe the banks of the Watts and the mountain streams, where it is first associated with the Tree Violet, *Hymenanthera Banksii*, and grows along with many riverside shrubs and trees, but no *Kunzea*, which, at the junction of the

Watts and the Yarra, has taken the place of *Melaleuca ericifolia*, a species that does not come within the area. Dwarf forms of *L. lanigerum* are also found on the Chum road in dry ground, not far, however, from the luxuriant front of the creek. In this place, and in company with these, are *L. myrsinoides* and a few stray bushes of *L. attenuatum*. *L. scoparium* usually keeps away from the main streams and favours rising ground. The piebald paper-bark, *Melaleuca*, is represented just outside the area by *M. ericifolia*, where its distribution ends on the Yarra and its flats near Tarrawarra. Inside the area the only species is *M. squarrosa*, in patches, of which the principal is at the back of Gracedale House, in the gully through which the Badger aqueduct pipe is laid to syphon under the Fernshaw road, and by this pipe-track it may be easily reached. In close association with it is *Acacia oxycedrus*, and, less thickly, *Acacia verticillata*, *Baueri rubioides*, and occasional clumps of the tall Coral Fern, *Gleichenia circinata*.

It is interesting to review and follow the association and diversions of the various tea-trees (including paper-barks). Following that somewhat artificial course, the railway line, the Woolly Tea-tree, *L. lanigerum*, persists, sometimes as a dominant and at others as a subordinate, all the way. Allowing for clearing, it is now patchy up to Mooroolbark, where *M. ericifolia* predominates. This relationship continues across the Yarra flats right to the junction of the Yarra with the Watts, and there, on the course of the former, *Kunzea peduncularis* takes the place of the Melaleuca, which drops out. *Kunzea* does not, however, go up the Watts at all, and *L. lanigerum* has no tea-tree associate, except in occasional patches of marsh, where *M. squarrosa* is met with. Along the flank of this line of march on the higher ground, and descending to the banks of streams at intervals, *L. scoparium* is constant. These plants, and those midway between the second story and the ground floor, lead us to consider plants more or less isolated.

ISOLATED PLANTS.

Although *Prostanthera melissifolia* is found in abundance at the head of Myers Creek and on the slopes of Mount St. Leonard, only one solitary specimen grows on quite low-lying ground a short distance from the junction of the Chum and Yarra Glen roads. Near this spot, too, is one plant of *Viminaria denudata*, which otherwise approaches no nearer than Coldstream. *Casuarina suberosa*, Sheoke, grows close to the tunnel, mostly on the Melbourne side, and there in open association with *Banksia marginata*. It is only found within the Healesville area on a small clay hill near the foot of Mount Riddell, where there is no Banksia. The principal habitat of *Hibbertia*

fasciculata is the neighbourhood of Chum road, where it associates with *Eriostemon corræfolius*, which also grows along the Fernshaw road. *E. myoporoides* favours the heights near Mount Donna Buang. *Comesperma ericinum* is a sparsely scattered plant found at long distances apart, and usually on the dry, lesser hills, as also the green variety of *Correa speciosa*; the red is rarely found here. *C. Lawrenciana*, a large shrub of the second story, frequents streams of the upper mountain gullies, but is most plentiful on the Graceburn, near the weir. The only plant of *Kennedya rubicunda* found in the district was a young one growing in a ploughed paddock near the town. It was removed to the owner's house, and has grown to a great size over a trellis. *Pultenæa Gunnii* is very generally distributed, but more freely at the mid-elevations, favouring the poorer hillsides. *P. scabra* is mainly confined to the western slope of the Myers Creek gully (facing east). *P. Muellcri* favours south-east slopes, and is there usually dominant. *Daviesia latifolia* grows at the tunnel cutting, and stray plants are found along the west edge of the bank, but it scarcely encroaches upon the area proper. *D. corymbosa* is found side by side with *D. latifolia*, but individual plants are scattered sparsely through the area. Both are secondary chasmophytes. *Gompholobium pedunculare* is found on the east slopes of the north-west boundary. Facing west, on the eastern bank of the Myers, is the only place that I have found *Hovea longifolia*. *H. heterophylla* is fairly common on some of the lowest hills.

In the *Platylobium* association outside the area, on and near the railway enclosure through Ringwood, the dominant species is *P. obtusangulum*, and within it *P. formosum*. This last-named species, like the former, is a prostrate form. It is plentiful on the sides of the road as far as Fernshaw, and on a slope from that road to the Watts Weir, where the growth is slightly more upright on a north-east aspect. After Blacks' Spur is crossed, and beyond the Hermitage to Narbethong, there is an extensive association of *P. formosum* in partially shrubby form, growing on a north-east aspect. The plants grow to over three feet in height, with perhaps an average of two and a half feet. I had the pleasure of seeing this patch, which extends quite a mile or more with little interruption, in copious bloom in November, 1911. It extends inwards from the road some distance, for I walked through it a mile or so from the road in a semicircular route from Narbethong to the Hermitage a few years before, about the same month. *Bossiaea cordigera* is principally found on both sides of the pipe track leading from Echo Tunnel to Watts Weir, and on the road below and in a patch on the Mount Riddell road between the Don road and the Badger aqueduct. It flowers between October

and December, and seeds are found ripe on it in the end of the latter month and in January. Many of the pods are covered by a pretty, cup-shaped yellow fungus, which prevents the formation of the seed, and identified by Mr. C. C. Brittlebank as *Accidium eburnum*, M'Alp. *Dillwynia floribunda* is plentiful in the Chum Creek and *Grevillea repens* formation, whilst *D. cinerascens* and *D. ericifolia* are plentifully distributed on the lower hillsides. *Indigofera australis*, in its normal colour, is scattered throughout the district. Here and there is seen a white variety, but very rarely. On the west bank of the Myers Creek road, between M'Donald's and the falls, it is very plentiful, and, growing close together, are the white, pink, and dark blue varieties, the last predominating. Intermediate shades are to be seen there, forming complete colouration links from the purest white to deep indigo. In view of the fact that colour, which was at one time thought to play an unimportant part in the character of flowers from a botanical standpoint, has now attained greater significance as indicating distinct constitutional changes, it may be well here to mention that *white varieties* are also seen here of blue or pink flowers, such as *Wahlenbergia gracilis*, *Prunella vulgaris*, *Glossodia major*, *Erythraea australis*, *Viola hederacea* (the white is not quite pure), *Tetratheca ciliata*, *Kennedyia (Hardenbergia) monophylla* (with an intermediate pinkish colour), several of the *Brachycomes* (but not to pure white), *Isotoma fluviatilis*, and a strong tendency to white is noticeable in some of the *Lobelias*.

Cryptandra Hookeri, the only one of the genus here, is in company with *Pomaderris apetala*, a denizen of the higher gullies and streams, and is very plentiful, and in that sense scarcely an isolated plant. *Astrotricha ledifolia* is found on the sides of the Fernshaw road and stony hillsides above the town in similar situation to the Yellow Waxflower, *Eriostemon corraefolius*. *Panax*, in the upper and some of the lower gullies, grows in its two forms, *P. sambucifolius* and *P. dendroides*, and on the Toolangi side of Mount St. Leonard are a few specimens of *P. Murrayi*. Most of the plants representing the Umbelliferæ, as *Hydrocotyle* and *Xanthosia dissecta*, belong to the carpet vegetation. *H. geranifolia* frequents the banks of small watercourses in the upper ranges; *H. hirta* and *H. laxiflora* the banks of lower streams. *Exocarpus cupressiformis* is a member of the association on lower hills of eucalyptus and the scrubby acacias, *A. linearis* and *A. stricta*, and is probably semi-parasitic on their roots. The beautiful flowering *Lythrum salicaria* grows in or near the water of swamps, generally amongst reeds, *L. hyssopifolia* on the moist grass flats; but as these plants are also well known in European floras there is more than a suspicion that they have been introduced.

The Chum Creek flora is different in many respects from the rest of the area. The banks bear different plants from those on streams running from east to west. Of these, the most noteworthy are *Pomaderris prunifolia* and *P. vaccinifolia*, whilst it has also *P. apetala*, which is common to all the streams. *P. subrepanda* occurs on the Yarra near the confluence of that river with the Watts. Several of the orchids found along this road are rare or unknown in other parts, particularly the long-leaved Duck Orchid, *Cryptostylis longifolia*.

The arboretum is elfin, and the carpet is in places lycopodinous. It is worthy of separate investigation and description. At the time of writing large fires are destroying the flora, and there is every reason to suppose that in the near future it will be almost entirely destroyed. Some plants have already been burnt and dug out altogether, the most to be regretted being *Clematis aristata*, var. *Denisii*, of the adjacent Long Gully.

Lianes.—Climbing up the trunks and massing on the lower limbs of the higher trees, and sometimes covering those of the lesser ones, the mountain streams produce *Tecoma australis*, beautiful both in foliage and flower. Of more extended range, and more delicate of habit, is *Clematis aristata*, to a less extent a moisture lover, whilst frequently on river banks and moist places, from the lowest flats to the highest gullies, *Lyonsia straminea* is seen, the older plants having, for a height of 20 feet or more, scarcely a leaf, whilst the foliage forms a nest-like top amongst the boughs of its supporting tree. The flowers of the *Lyonsia* are somewhat insignificant, the remarkable feature of the plant being the long pod-like fruits which, when ripe, open and expose their white pappus-covered seeds. The tangle further consists of several *Cassythas* and the grass *Ehrharta juncea*, *Hardenbergia monophylla*, *Glycine clandestina*, and the Love Creeper, *Comesperma volubile*.

Another form of association is that which might be termed after-fire societies. These are composed of thickets which spring up after bush-fires, and are composed of quite different units, which undoubtedly obtain their position from opportunity. It is difficult at first to reconcile the facts that the same actuating cause results in one place in a thick growth of *Cassinia*, which springs from light and flimsy seed such as fire would easily destroy, and in another a thicket of acacia, whose seeds may have long lain in the ground awaiting fierce heat to scarify their tough integuments. In both cases fire is a distributing and collecting agent; but in the case of *Cassinia* it is a destructive agent also. The interesting feature is that, whereas the action of fire destroys seed and roots of many grasses, and by the annihilation of humus prevents their

repatriation for a long period, yet the same burnt soil is sanctuary for *Cassinia*, *Acacia*, *Eucalyptus*, and the harder-seeded leguminous and myrtaceous plants, as also for the extremes—mosses, ferns, fungi, and *Marchantia*—particularly the latter. Fire thus accounts for the total or partial elimination of some species and the predominance of others. It has also another mode of causing a change in the relative proportion of trees by its effect on mature forms, for, whilst it destroys absolutely most other individuals that it attacks at all badly, of the eucalypts the smooth and finer-barked ones rarely recover; those with fibrous barks, such as *E. obliqua* and *E. Stuartiana*, not only recover but send out strong side shoots, which, though spoiling the trees for timber purposes, produce abundant fruit. The protective feature of the smooth, white-barked eucalypts is that they do not readily catch fire, and in a swift blaze escape altogether.

On the southern face of Mount Monda is a patch of some acres in extent which has been completely divested of the upper story of vegetation (eucalyptian) and of the lower stratum (sclerophyllous bush). The soil was apparently shallow, and rain falling and running down the steep hillside exposed the rock, which subsequently gradually became covered with lithophytes; these, supplemented by soil washed from higher parts, the growth of moss, and banking on lower edges by talus, have formed a distinct field of special vegetation selected from the environs—a pteridetum interspersed with xerophytes, mostly of leguminous genera. Ground not rid of soil, often, after fire, rehabilitates itself—first by fungus and soon after by strong growths of *Marchantia*, both the common *M. polymorpha* and the rarer *M. tabularis*. In close association with these follows *Polytricha commune*, and they are the forerunners of a new but long-deferred vegetation, often heralded by introduced weeds. The associations of *Pteris aquilina* are noteworthy. Sometimes they are spread in open formation right through an extensive area of timber country, at others scattered individuals only are found; but the usual habit is in large clumps. These last close formations are to be attributed to drifts of wind-blown spores rather than any congenial character of soil, feature of situation, or light. This is exemplified by patches in older cleared paddocks, which have been more or less cultivated and generally used for grazing. Clumps of bracken may be seen growing against fallen logs and around trunks or stumps of trees—not that there is any virtue in these to attract the plant, but they have formed breaks against which the spores have piled, and, retaining moisture, have sheltered growing young and formed at each spot a pteridetum. These features are not peculiar to this

particular district, but more or less to the class of country of which it forms a part.

Rock Covering.—The railway line has been opened about twenty-seven years, and the cutting has looked much the same during the last ten years, at the least. The hard face of almost vertical rock is patched over with flat lichens, mostly round, from little more than apparent stains to those considerably raised, just as one sees them on a neglected slate roof, and it is understandable why the symbiotic habit of this plant, with its humble allies, is necessary to sustain life in such conditions, on the sharing principle of Jack Sprat and his wife. Here Nature leaves her finger-prints upon the wall that she may be identified.

Mosses, next in vegetative progression, fill little nooks and crannies and cling to the softer portions of the wall. On the banks where the surface has been removed are large patches of moss, chiefly *Polytrichum*, and these, drying in midsummer, afford fine colour protection for the grasshopper, *Exarna australis*. In places where there is a little more soil are many kinds of the herbaceous Xerophytes, such as *Erythrea australis*, *Hypericum japonicum*, and the Willow Herb, *Epilobium glabellum*, and, in stunted forms, the neighbouring shrubs and trees, *Kunzea peduncularis*, *Leptospermum scoparium*, *Pultenaea Gunnii*, *Daviesia latifolia*, *D. corymbosa*, *Goodia lotifolia*, *Cassinia aculeata*, *Exocarpus cupressiformis*, *Casuarina suberosa*, and three eucalypts, *E. obliqua*, *E. rubida*, and *E. amygdalina*, with the welcome variation of trails of *Hardenbergia monophylla*. The Whiptail Fern, *Asplenium flabellifolium*, is almost a lithophyte, fastening into rocks which have scarcely any covering but moss or lichen. Having so clung, it hides, however, in a shady crevice or beneath a shelf. This habit is noticeable, too, in the common maiden-hair fern, which, however, can adapt itself to many situations, from barren rocks to the wet loam of a stream bank. Somewhat different are the species that adapt themselves to hard roadsides, as the Knotweed, *Polygonum aviculare*, white clover, and *Lythrum hyssopifolia*, defying the traffic to a considerable extent. Those that favour the less-used roadside might be justly classed with the chersophytes (waste land plants) found mostly in back yards and rubbish tips, and between the two, and including most of their components, is the more modern sodality, the vegetation of railway lines, the cradle of exotic weeds.

Of the carpet vegetation of the flats, except such as consists of grasses, the dominant features have been fairly indicated. The lowest hill-covering differs considerably. It is an association of most of the lithophytes, dwarf forms of many of the

herbaceous plants, the lesser ferns, moss, *Marchantia*, and fungi, the humble associates of after-fire societies.

Gratiola Peruviana in the lower hills takes on a similar habit to that of *Limnanthemum exaltatum* in the flats. It favours damp miniature gullies and water-holes, or any spot where moisture collects. In the hills there are many spots distinctly favoured by special vegetations, as sandy washes, which are sought by such plants as *Centipeda Cunninghamii*, *Lythrum hyssopifolia*, and *Veronica gracilis*. Similarly, in soakages at various altitudes are *Sphagneta*, which are bogs in wet weather and in summer desiccated patches. Each formation is worthy of separate treatment—at least, those that together form a stratum. Treatment as a whole leads to almost unavoidable digression, and away from that definite and informative description so desirable. On the other hand, it leaves the field more open for observation by indicating the scope it affords.

Lists have been prepared of the native plants and mosses, with some indication of their part in the oecological scheme, and also of the naturalized aliens, and exhibited on the table is a sketch showing the district as it would have appeared with the water-courses dammed back.

THE DECAY OF TIMBER.—At the May and June meetings of the Microscopical Society of Victoria, Mr. C. F. Linblade, Mains Superintendent of the Melbourne City Council Electric Supply, gave an interesting lecture on "The Decay of Wood," referring principally to the deterioration and destruction of wooden structures in connection with electric current distribution. It had been found that a slight leakage of current from an underground electric cable helped to destroy the wooden cable troughs. In one instance the trough was found to be rotting on one side. Inspection revealed that a leakage of current was occurring there, which promoted a vigorous growth of certain destructive fungi and bacteria, the woodwork being in a state of fermentation, and a fragment treated in a test-tube gave off carbonic acid gas. The fact that electric cables keep the ground in their neighbourhood at a certain fairly even temperature seemed to be responsible for the flourishing growths of fungi often found in their vicinity. The toadstools often found growing at the bottoms of telegraph poles were very destructive. Their roots penetrated into the wood, producing ferments which destroyed all but the threads of cellulose, and so weakened the pole. Other fungi gained access to the poles above ground through cracks, and caused the interior to crumble. One particular fungus turned the wood to a beautiful deep rose colour, and was one of the most harmful known in Melbourne.

A NEW USE FOR MICE.—I was rather interested recently in watching a mouse in a furniture shop window at Collingwood. It was running up and down without any apparent motive, when I noticed it stand on its hind legs and catch a fly. I saw it catch several, and in some instances the little animal jumped up the window and caught the flies. The shopkeeper told me this mouse was busy catching flies nearly all day. I asked him if he were going to set a trap. He said, "Oh, no, it keeps the windows clean, and in winter I feed it." Would that every shop window had a mouse in it! Many of them would be much cleaner than they are at present.—HARRY WITTY, Box Hill.

"THE AUSTRALIAN ZOOLOGIST."—Under the title of *The Australian Zoologist* the Royal Zoological Society of New South Wales has issued the first part, dated 13th June, 1914, of a new serial. It is somewhat unusual in shape, the letter-press being $5\frac{3}{8} \times 7\frac{3}{8}$, with wide margins, a size which, however, will afford ample room for good-sized plates, of which there are four in the present number. The part opens with the annual report of the society for 1913, it having been established in 1879. Among the scientific articles are a monograph of the genus *Tisiphone*, Hubner, in which is now included the butterfly formerly known to Victorian collectors as *Epinephile abeona*, and to distinguish its several varieties the author, Mr. G. A. Waterhouse, B.Sc., has introduced the trinomial system, at present so disturbing the thoughts of Australian ornithologists. Mr. W. J. Rainbow, F.E.S., describes a new Victorian spider, *Neostorena venatoria*, from Ferntree Gully, and Mr. A. R. M'Culloch communicates an article by Rev. T. R. Stebbing, M.A., F.R.S., describing a new Victorian marine crustacean, *Parapato gabrieli*, collected by Mr. J. Gabriel at Western Port. A very fine plate is given of the male Chimpanzee at the society's gardens in Moore Park, and Mr. A. S. Le Souëf, the director, gives a few notes as to the animal, which now fully grown, and about seven years old. He weighs 158 lbs., and in the slightly stooping position often assumed measures 4 feet 2 inches in height.

B.A A.S.—If for nothing else, the visit of the British Association to Australia will be marked by the excellent handbook it has been the means of having produced. Its 600 pages form a very valuable and concise description of Australian features, and is alone almost worth the whole of the subscription charged for the privilege of joining the meeting. The Victorian handbook is also a valuable compendium of information more or less familiar to local residents.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 10th August, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 45 members and visitors were present.

REPORT.

A report of the visit to the National Herbarium on Saturday, 8th August, was made by Mr. J. R. Tovey, who intimated that, owing to the unavoidable absence of Professor A. J. Ewart, the duty of conducting the visitors over the Herbarium devolved upon him. The weather being more appropriate for an outdoor excursion no doubt contributed somewhat to a small attendance, only ten members taking part. A complete set of the plants proclaimed under the *Thistle Act* for Victoria was shown, as well as a set of poisonous or injurious plants. A number of specimens collected in Australia by Robert Brown during the years 1802 to 1805 proved of great interest, as did also a set of specimens from Petiver's collections made over 200 years ago, principally from India; both these collections are still in a good state of preservation. After having examined the various items of interest in the Herbarium the visitors were shown through the library, and were greatly interested in the many valuable volumes, but regretted that the time at their disposal was not long enough to study them in detail. It may be useful to members to give a short *résumé* of the uses and objects of the Herbarium. The National Herbarium, which is situated in the Domain, in close proximity to the Botanical Gardens, was established by the late Baron von Mueller in 1857. It now contains fully one and a quarter million sheets of herbarium specimens from all parts of the world. The great value of this may be estimated when it is known that the Herbarium possesses 12,000 type-specimens of plants. A type-specimen is the original one from which the plant was first described, and which, like a physical standard, serves for future comparison. It differs from a physical standard in this respect—a type-specimen, when lost or destroyed, cannot be replaced. No other herbarium in the world is as rich in type-specimens of Australian vegetation as is our National Herbarium. In addition, the Herbarium possesses a fine reference library of over 9,000 books, journals, &c. Many of these are of great value, among them being

several by pre-Linnean authors. Some were published as far back as the year 1532. It is certainly the finest botanical library in the Southern Hemisphere, and, like the Herbarium, is accessible to all botanical workers for reference. It may be mentioned that the annual correspondence averages 1,500 letters, and the advice and information given to correspondents and visitors range over every department of botanical science, from the naming of plants to the nature of plant metabolism. Identifications are made not only for local correspondents and Government departments, but also for scientists in Europe and America and all parts of Australasia. The Herbarium is also used by the Commonwealth for the investigation and recording of the flora of the Northern Territory. In addition, the staff is systematically arranging the large collections of Australian and non-Australian plants received from time to time, and the work of preparing records for compiling a new "Flora of Victoria" is being proceeded with. Species and genera new to science are determined and the descriptions published from time to time, while many alien species have been determined and recorded as new introductions in Victoria. It need hardly be mentioned that any persons who are interested in botany may avail themselves of the facilities for obtaining information at the National Herbarium.

DONATION TO THE LIBRARY.

The president, Mr. J. A. Kershaw, F.E.S., acknowledged, on behalf of the Club, the gift from the authors and publishers of a copy of a new work, "The Butterflies of Australia," by Messrs. G. A. Waterhouse, B.Sc., B.E., and Geo. Lyall, F.E.S., both members of the Club. Referring to the volume, he stated that it contained about 240 pages of letterpress and 43 plates containing some 900 illustrations. It was the outcome of a life's study, and was the first work to fully describe and illustrate the whole of the known Australian butterflies. A general scheme of up-to-date classification was followed throughout, which facilitates comparison and identification. The subject had been exhaustively dealt with by the authors, and members would be deeply grateful to them for their magnificent donation.

REMARKS RESPECTING EXHIBITS.

Referring to his exhibit of a thin slice of phosphatized oolitic limestone from Ocean Island, South Pacific, Mr. F. Chapman, A.L.S., said:—"In the microscope slide shown the rock is seen to consist of a number of ovoid pellets varying in diameter from the size of a blanket pin head to a pea. Under the microscope the pellets show a regular concentric structure like miniature onions. These pellets are surrounded by an even-

grained mass of sub-crystalline mud, and they are all more or less uniformly spaced out from one another. Its history seems to be as follows:—A granular sand was formed by the agency of lowly plants—probably belonging to the blue-green algae—which secreted carbonate of lime from the sea-water in order to make the limy tubular thallus forming the concentric coats of each grain. Such oolitic grains are now being formed on the shores of the Great Salt Lake of Utah, and in the warm springs of Carlsbad, in Germany. The loose grains were then surrounded by mud, and the spacing by means of spiky crystals developed round each grain took place. The whole was consolidated as a pure limestone. In the course of time flocks of sea-birds found their resting-place on the island, and their droppings formed the guano deposit. The rain which fell upon this guano deposit carried the phosphoric acid downwards into the underlying limestone rock, and a gradual change ensued, resulting in the complete phosphatization of the limestone as it now occurs."

Adverting to Mr. A. L. Scott's exhibit of crocidolite, Mr. Chapman said:—"The name is derived from 'kroke,' a thread, and not from 'krokoeis,' saffron-coloured, as sometimes supposed, for, as a matter of fact, the true crocidolite should show the blue asbestosiform and silky character of the mineral, and not the yellow 'cat's-eye' form. The latter variety is a replacement of the original silky hornblende or true crocidolite by pseudomorphs in quartz, the quartz fibres being coated at intervals with the hydrated ferric oxide—limonite or yellow ochre. The iron mineral imparts a yellow colour to the mass, in which condition it is called Griqualandite, from its occurrence on the Orange River in Griqualand, South Africa."

Mr. J. Searle, in calling attention to his exhibit of specimens of volvox under the microscope, said that volvox, though common in most fresh-water pools, was an extremely beautiful object, and of great biological interest. For many years it was claimed by botanists as a green alga, but is now conceded to the zoologists as a flagellate infusorian, occupying a place between the Protozoa and the Metazoa. In the first-named group all the functions of life are carried on within its single cell; in the Metazoa distinct sets of cells are specialized for various activities; while volvox consists of a vast number of zoids embedded in a spherical gelatinous mass, each zoid possessing two flagellæ, which project through the gelatinous envelope, and to their regular action the well-known rotary and progressive movements of volvox are due. The sexual colonies of volvox exhibit the beginning of that differentiation between body cells and reproductive cells which becomes more characterized in higher forms of life.

NATURAL HISTORY NOTE.

Mr. J. A. Kershaw, F.E.S., mentioned that the National Museum, Melbourne, had recently received a fine female of the Tasmanian Devil, *Sarcophilus ursinus*, Harris, from the North-West Coast of Tasmania, which carried four well-developed young in the pouch. These were quite blind, and varied in total length of head and body from 150-157 mm. : tail, 45-49 mm. ; hind foot, 23-25 mm. All four were females, with four distinct mammae in each. The head, body, and tail, except the rump and base of tail, were well furnished with black hair, the rump being very sparsely covered with pale hair. The body markings which are white in the adult were of a creamy white in the young, and, as in the adult, were variable in their distribution, the chest markings being present in all, while two showed a spot behind the elbow, the rump marking being entirely absent in one specimen and more or less defined in the other three.

EXHIBITS.

The evening was set aside for exhibits under microscopes, the following being the principal exhibitors, with the objects shown :—

By Mr. F. Chapman, A.L.S.—A thin slice of phosphatized oolitic limestone, from Ocean Island, South Pacific Ocean.

By Mr. A. D. Hardy, F.L.S.—Slides of various forms of leaf vestiture; various stomata; section showing haustoria of European Dodder, *Cuscuta epithemium*, penetrating stem of clover; section showing penetration of branch of Australian Dodder-Laurel, *Cassytha melantha*, by haustoria of another portion of same branch (for description see *Proc. Aust. Assoc. Science*, Melbourne, 1913, page 321).

By Mr. J. Searle.—*Volvox*, copepoda, and cladoura of various species and a number of rotifera.

By Mr. J. Stickland.—*Thuricola operculata*, from Botanic Gardens.

By Mr. J. Twyford.—Leaf of *Deutzia gracilis* (?), showing stellate hairs, under polarized light; also palates of molluses.

By Mr. A. L. Scott.—Marine algae, with diatoms, from Sorrento; cat's-eye crocidolite; dacite from Marysville; basalt from Tasmania; oblique section of horn of rhinoceros; section of stem of nettle; also viewing screen used in Paget colour process, also literature dealing with same.

By Mr. J. Wilcox.—Tube-building rotifer, *Melicerta ringens*.

The following exhibits were also made :—

By Mr. G. Coghill.—Flowering specimens of *Acacia linearis*,

Sims, *A. diffusa*, Edwards, *A. myrtifolia*, Willd., *A. leprosa*, Sieber, *A. dealbata*, Link., *Epacris impressa*, Labill., *Hovea heterophylla*, Cunn., collected at Mooroolbark.

By Mr. J. E. Dixon.—Two species of Amycterides (Curculionidae)—*Talaurinus carinatus*, Ferg., *Sclerorinus amycterooides*, Ferg., new to science, taken at Portland, December, 1912, and recently described by Dr. E. W. Ferguson, M.B., Ch.M., of Sydney.

By Mr. H. Witty.—Photographs of Emperor Moth, *Saturnia carpini*, emerging from cocoon; and stick insect, *Bacillus rossi*.

After the usual conversazione the meeting terminated.

EUCALYPTS.—A series of six University Extension lectures on eucalypts has been arranged to be given by Mr. P. R. H. St. John, at the Royal Society's Hall, on Wednesday evenings, commencing on 16th September. There will also be three field lectures, at Evelyn, Eltham, and the Botanical Gardens respectively. The price of the course is 10s., and intending members should communicate at once with Mr. P. D. Flower, 352 Collins-street, Melbourne.

THE "GEELONG NATURALIST."—Among other interesting articles in the *Geelong Naturalist* for May last will be found an illustrated paper by Messrs. J. F. Mulder and R. E. Trebilcock, entitled "Victorian Hydrozoa, with Descriptions of New Species." Mr. Mulder in a separate article gives some notes on the Waurn Ponds limestone fossil beds; while Dr. Hall gives some account of a little book printed in Geelong more than fifty years ago, called "Sea and Riverside Rambles in Victoria." Though published anonymously, it was, no doubt, written by Samuel Hannaford, an enthusiastic field naturalist of the fifties.

AUSTRALIAN FOREST LEAGUE.—The annual meeting of the Victorian branch of the Australian Forest League was held at the Melbourne Town Hall on 25th August, when His Excellency Sir Arthur Stanley presided. In supporting the adoption of the report, which outlined the work of the League to the present date, the chairman took the opportunity of urging much greater attention to forestry and the conservation of timber, in view of the very great shortage which is looming not far ahead. The support of all interested will be greatly appreciated by the council. Copies of the report and particulars of membership can be obtained from Dr. C. S. Sutton, Carlton, hon. sec. *pro tem.* The subscription, 2s. 6d., being a nominal one, we trust there will be a good response in the way of new members.

VICTORIAN HEPATICÆ.

BY R. A. BASTOW.

(Read before the Field Naturalists' Club of Victoria, 13th July, 1914.)

I DO not think that there has been any paper for elucidating the study of the Hepaticæ of Victoria either in the *Proceedings of the Royal Society* or in the *Victorian Naturalist*; therefore I have very slight hesitation in bringing forward the accompanying key to genera of that beautiful and interesting natural order of cryptogamic plants. The literature on Hepaticæ is neither voluminous nor is it very accessible; we have, consequently, to depend on British and Continental writers for our information. Hooker's "Flora Tasmanica," "Flora Novæ-Zealandiae," and "Flora Antarctica," with "Muscologia Exotica" and Cook's "British Hepaticæ," with latterly Engler and Prantl's beautifully illustrated and magnificent work—these are simply indispensable to pursue the study of Hepaticæ with any success. Fortunately, the above-mentioned books can now be consulted in our Public Library or in the library of the National Herbarium, South Yarra.

Nearly thirty years ago I resided in Hobart, and had free access to the Royal Society's library there and to Mount Wellington and its spurs. Whilst in Hobart I submitted a paper to the Tasmanian Royal Society for the year 1887. This was printed in their "Proceedings," with forty-three plates, and containing the descriptions of all the then known Hepaticæ, each genus being illustrated. I do not know of any other than the before-mentioned works, to which I refer the student for more extended information than the limits of the Field Naturalists' proceedings will allow on that subject.

The question has often been put to me, What is a hepatic or liverwort? When we are in the gullies it is very easy to reply to that question. Take a handful of *Lepidozia ulothryx* and submit it to the inquirer, and his exclamation will be, "How soft it is, and how spongy!" They are water-loving plants; by the edge of the creek and around the scattered rocks in the stream they flourish and reach perfection. They were formerly known as *Jungermanniæ*, named in honour of Louis Jungermann, a German botanist; but in later years they have all been known under the one common name, Hepaticæ.

The texture of the Hepaticæ is soft and with lax areolation. The leaves of the plants, unlike the mosses, have no nerves. Some hardy species favour the sunnits of the highest mountains, and, with their faces to the south, they meet the storm and revel in it. Some are six inches high, and some are small and capillary and almost indistinguishable on the fallen tree-ferns. The forms of the leaves are exquisite; they are often

serrated, or divided, or margined, or entire, and are of various colours. A fruiting specimen is not very easy to be obtained. The fruit-stalks are like silver threads, almost transparent, and generally very lax, and not erect unless they are in a crowded tuft. The fruit cannot well be mistaken, for it usually opens in a cruciate form with four valves. Sometimes the elaters will be found adhering to the opened valves; the latter are like microscopic springs, and in freshly-opened capsules they writhe about, apparently spreading the spores right and left.

I shall never forget my first introduction to a creeping hepatic called *Polyotus magellanicus*. It is shown at Fig. 18 in the page of illustrations. We were slowly climbing up the Mount Wellington track when I observed a small plant with lobules on the bases of the leaves resembling clubs, and very different to any that I had seen before. The colours were rich brown, and quite new to me, and I felt much the same as Linnæus felt when he beheld the golden crop of furze in full bloom on the moors in the North of England. I was glad, and rejoiced to see this tiny plant, so beautiful in structure and yet so tiny, so adapted to its purpose—it clothed the old tree like a mantle, "so that none might mock the dead."

Few people deign to notice these small forms of vegetable life—they are too small. When the student has collected the ferns and lycopods, he usually draws the line. I recollect well about 40 years ago that I was in a railway cutting, and at the sides of the cutting I drew out some calamites two feet long, but crushed flat; they were the remains of a large forest of gigantic *Equisetæ*, or "horse-tails," and coal-pits close at hand—that was cryptogamic growth of former ages, to which we owe so many comforts in the cold winters of Britain. It was easy then, with the surrounding conditions, to picture the country crowded with *equisetum* 40 or 50 feet in height, and the diptera buzzing about one in whole brigades. These plants (the *equiseta* were like umbrella skeletons turned upside down and socketed into each other) and flies and lizards were at home in those moist levels, as they are still at home in this country. In Macedon and in Ferntree Gully the decaying logs are crowded with *Hepaticæ*, lowly plants, growing to six inches in height. *Gottschea Lehmanniana* has its leaves very much laminated, so that it is a difficult matter sometimes to separate them for the determination of the species. The cavities of the fallen logs are all occupied with mosses and *Hepaticæ*, and some are very minute; some are covered with *Polyotus magellanicus*. In the velvety masses of *Lajeunia* each leaf has a sack; the water found in these sacks is full of life. These plants, with proper leaves, are known as the *Foliosæ* in the accompanying key, with distinct leaves and stems. Other

Hepaticæ have no distinct stem or leaf; these are fused into one large leaf-like frond, and are named the Frondosæ. To this section the Metzgeria belongs; it will be found forming a perfectly flat network around the bark of living trees. It is well to take the bark of the tree, and the student will be amply repaid when he is settled down to examination with the microscope.

Another section of this order is called Carnosæ. Here the fronds are fleshy, broad, and of a vivid green colour, with many scales on the under side. They cover moist rocks and stumps, and sometimes grow on earth. By the aid of a pocket lens the gemma cups will be observed, surrounded with a beautiful pellucid fringe; they will remind the observer of a miniature bird's nest with eggs in it. In the *Marchantia polymorpha* these cups are all round; in *Lunularia* they (the cups) are lunate or crescent-shaped, and are common in Fitzroy Gardens.

The remaining section—the Anthoceratæ—have also fleshy fronds, but are without scales underneath.

The plants of this natural order are nearly always procumbent. The dorsal side is the upper side as it grows; the ventral side is next to the ground.

The reproduction processes are similar to those of the mosses. The antheridea (the male organs) and the archegonia (female organs) are shown on the illustration at Fig. 42. The latter—the archegonia—are slender, flagon-shaped bodies, with a central cavity communicating with the atmosphere by a tubular neck; in the cavity there are loose, solitary cells, and the anthrozooids gain access thereto and fertilize the same. The antheridia are small round bodies, usually solitary, in the axils of the leaves; these antheridia contain cells with spiral filaments—the antherozoids.

The stipules are a third rank of leaves, and afford a specific character to the plant when they are present. Sometimes they are much divided, and sometimes entire. The stem is frequently beset with numerous radicles, which materially assist in maintaining the plant. Other Hepaticæ have no distinct stem nor leaves, these organs being fused into one flat leaf-like frond, and named in the key the Carnosæ. To this section of Hepaticæ the *Marchantia* belongs. It usually grows in salubrious situations or near water, and sometimes it finds a home in the hot-house. It is a uniform dull green colour, usually once or twice dichotomous (*i.e.*, forked), and is covered below with numerous silken radicles. The receptacle of the antheridia of *Marchantia* is on a short stalk near the end of a frond, and on the top side of the stalked receptacle the antheridia are immersed. The female receptacle is also pedunculated, and is divided into eight or ten decurved rays, covering as many

involucres, along with minute chaffy scales. The elaters of this plant are bi-spiral. The gemmiferous cups are full of gemmæ or buds; these are scattered by the breezes and are another form of reproduction, corresponding to the buds or bulbils in liliaceous plants.

In *Zoopsis argentea* we see a most singular plant, without leaves, discovered by Dr. Hooker. Its fronds are very minute, about a quarter of an inch long by a twentieth in breadth. It sometimes fruits, hence we know what it is. I was somewhat excited when I found this, and, keeping a wary look-out in quest of other plants, espied a lovely *Hypneum chrysogaster*, a mass of a bright golden colour, around one of the branches. It did not take me long to scramble up the tree over the stream; but in that fatal act the catch of my vasculum was caught, and I had the mortifying spectacle of seeing my carefully wrapped specimen sailing merrily down the stream, waterfalls and everything. One grain of comfort I had, however, when I found *Zoopsis argentea*—one silvery specimen—yet in the vasculum. You may depend I had that catch made stronger, and another lesson I received was to wear a cap, so that the branches could not pull my hat off. In the gullies a hint to the wise is sufficient. The Anthoceros is another strange plant; it is shown at Fig. 8. The fruit arises from conical tubercles, and resembles a blade of grass; but when ripe each blade splits into two halves, and the spores are resting inside, with the elaters writhing about with the moisture imparted to them by the breath. Fimbriaria is another peculiar form of the genera in the Carnosæ section, and under the microscope, with a $1\frac{1}{2}$ " objective, it resembles a couple of nets full of oranges; the latter are the spores. *Metzgeria furcata* is a pale and pleasant green; it creeps over the bark of trees, and has a singular fruit. When once collected, it will never be forgotten. With the aid of a microscope the calyptra appears beset on every side with whitish hairs. It is a very beautiful plant, but very minute, and some are beautiful microscopical objects.

A great number of the Hepaticæ are very small, and must be examined rather closely in order to determine the genus.

1st.—Determine if the plant possesses distinct leaves. If it does, its genus must be looked for in the section Foliosæ.

If the plant has not leaves, but is simply a long or short thin frond, it belongs to section Frondosæ.

If the frond is fleshy, with scales on its under side, it will be amongst one of the six genera in the Carnosæ.

If the frond is fleshy, but without scales beneath, it then comes under the section Anthoceratæ.

Assuming that the plant to be identified has distinct leaves, it is foliaceous, and the manner in which the base of the leaf

is set on the stem must be accurately determined. It may be succubous, or vertical, or incubous ; it will come under one of these three headings. If succubous it will belong to one of the genera distinguished by a star (fig. 37). If the leaves are vertical it will belong to one of the genera distinguished by two stars (fig. 28) ; and if incubous, it will be distinguished by three stars (fig. 24).

3rd.—Note the perianth, whether it be leafy, or whether it is a fleshy bag ; or it may not have a perianth. Assuming that the leaves are succubous, and that the perianth is leafy,

4th.—Ascertain whether the fruit is lateral or terminal. Make a note of the particulars ascertained by observation, then read the short descriptions of the genera in the key. We may find that one genus has stipules, another without stipules, or another one with the leaves deeply cleft, &c. The differences are sufficient to determine the genus.

In the following Key to the Genera of Hepaticæ I have found great assistance from the volumes by Engler and Prantl, and especially in the illustrations on the Hepaticæ in *1 Tell., Abt. 3*, of that monumental work. I am quite conscious that the key is not perfect—it has been accomplished as well as my ability will permit ; but, as a rule, I have preserved the old generic names by which the plants are best known in Australia. In my "Key to the Genera of Tasmanian Hepaticæ" the division *Foliosæ* is placed first ; in the accompanying key I have placed the *Carnosæ* first, then the *Frondosæ*, and lastly the *Foliosæ*. I don't know that it makes any great difference, but I bow to Engler's arrangement. It may possibly make the study of the Hepaticæ easier to beginners, and it may be on more scientific lines.

CARNOSÆ.—Fronds fleshy, with oblique scales on the under side.

(a) *Fruit embedded in the substance of the frond.*

RICCIA.—Figs. 1 and 2.

(b) *Fruit terminal on the under side of frond.*

TARGIONIA.—Involucræ two-valved. Fig. 3.

(c) *Fruits many, on the under side of a stalked peltate receptacle.*

HYPENANTRON (*Fimbriaria*).—Perianth split into bands, cohering at their apices ; opening downwards. Fig. 4.

LUNULARIA.—Fruit stalked : opening with four valves. Fig. 5.

REBOULIA.—Perianth none ; involucræ opening by two valves. Fig. 6.

MARCHANTIA.—Perianth opening downwards. Fig. 7.

ANTHOCEROS.—Frond fleshy, without scales beneath. Fig. 8.

FRONDOSÆ.—Without distinct leaves.

(a) *Perianth none.*

METZGERIA.—Fruit on under side of frond ; nerve narrow.
Fig. 9.

ANEURA (*Sarcamitrium*).—Swollen, but nerveless ; simple, or with one or two lobes. Fig. 10.

BLASIA.—As Aneura, but more dichotomously divided ; thinnest at margins ; small scales on under side ; unequally dentate ; lobes often incurved. Fig. 11.

HYMENOPHYTON (*Symphyogyna*).—Fruit on upper side of stipitate, orbicular frond ; nerve narrow. Fig. 12.

SYMPHYOGYNA.—Frond obtruncate, dark green, serrate. Fig. 14.

(b) *Perianth complete.*

PODOMITRIUM.—Perianth from the under side of a continuous frond. Fig. 13.

BLYTTIA (*Steetzia*, Syn. Hep., 475).—Perianth from upper side of a continuous frond. Fig. 15.

NOTEROCLADA.—Involucre confluent with perianth, erect, on the upper side ; no stipules ; lobes entire, soft. Fig. 16.

ZOOPSIS.—Perianth lateral ; frond continuous, with alternate lateral projections tipped with cilia. Fig. 38.

FOLIOSÆ.—Leaves distinct.

* Leaves succubous ; base with lowest angle on the upper side of the stem. See fig. 37.

(a) PERIANTH LEAFY.

1. *Fruit terminal.*

PLAGIOCHILA.—Perianth compressed ; stems erect or ascending ; no stipules. Fig. 37.

LEIOSCYPHUS.—Perianth compressed ; stems procumbent, stipulate. Fig. 36.

TEMNOMA.—Perianth above trigonous, truncate. Fig. 39.

LOPHOCOLEA.—Perianth triquetrous ; angles often alate ; mouth three-lipped, closed ; stems procumbent, stipulate. Fig. 35.

TRIGONANTHUS.—Perianth trigonous ; mouth contracted ; stems procumbent, stipulate near the fruit. Fig. 21.

JUNGERMANNIA.—Perianth tubular ; mouth contracted, dentate ; stipules none, or present on the stem. Fig. 20.

SOLENOSTOMA.—Perianth obovate, five-plicate above, with a tubular beak. Fig. 43.

2. *Fruit lateral.*

ADELANTHUS.—Stems erect, nodding ; no stipules. Fig. 40.

CHILOSCYPHUS.—Stems procumbent, stipulate. Fig. 34.

PSILOCLOADA.—Stems procumbent; leaves and stipules deeply cleft. Fig. 33.

(b) PERIANTH A DESCENDING FLESHY BAG.

Fruit terminal.

TYLIMANTHUS.—Stems erect or ascending; leaves nearly entire; no stipules. Fig. 32.

ACROBOLBUS.—Stems procumbent; leaves bifid, stipules small or none. Fig. 31.

LETHOCOLIA.—Stems procumbent; leaves entire; no stipules. Fig. 44.

BALLANTIOPSIS.—Stems procumbent, stipulate. Fig. 27.

** Leaves vertical, base crossing the stem transversely. See fig. 28.

PERIANTH LEAFY.

Fruit terminal.

ISOTACHIS.—Leaves and stipules nearly equal; perianth tubular; mouth connivent. Fig. 28.

SCAPANIA.—Leaves complicate; no stipules; perianth compressed in plane with leaves; mouth truncate. Fig. 22.

GOTTSCHEA.—Leaves with adherent lobes; perianth overlaid by involucral leaves. Fig. 41.

*** Leaves incubous, base with the lowest angle on the under side of the stem.

† Without an inferior lesser lobe.

(a) PERIANTH LEAFY.

1. *Fruit lateral.*

LEPEROMA.—Leaves and stipules deeply cleft; calyptora adnate with the involucral leaves; fruit near the top of stem. Fig. 26.

LEPIDOZIA.—Leaves and stipules usually deeply cleft; perianth near the base of the stem, trigonous. Fig. 30.

MASTIGOBRYUM.—Leaves and stipules entire, or with their apices truncate, dentate; perianth in the lower part of the stem, trigonous. Fig. 29.

†† With an inferior lesser lobe.

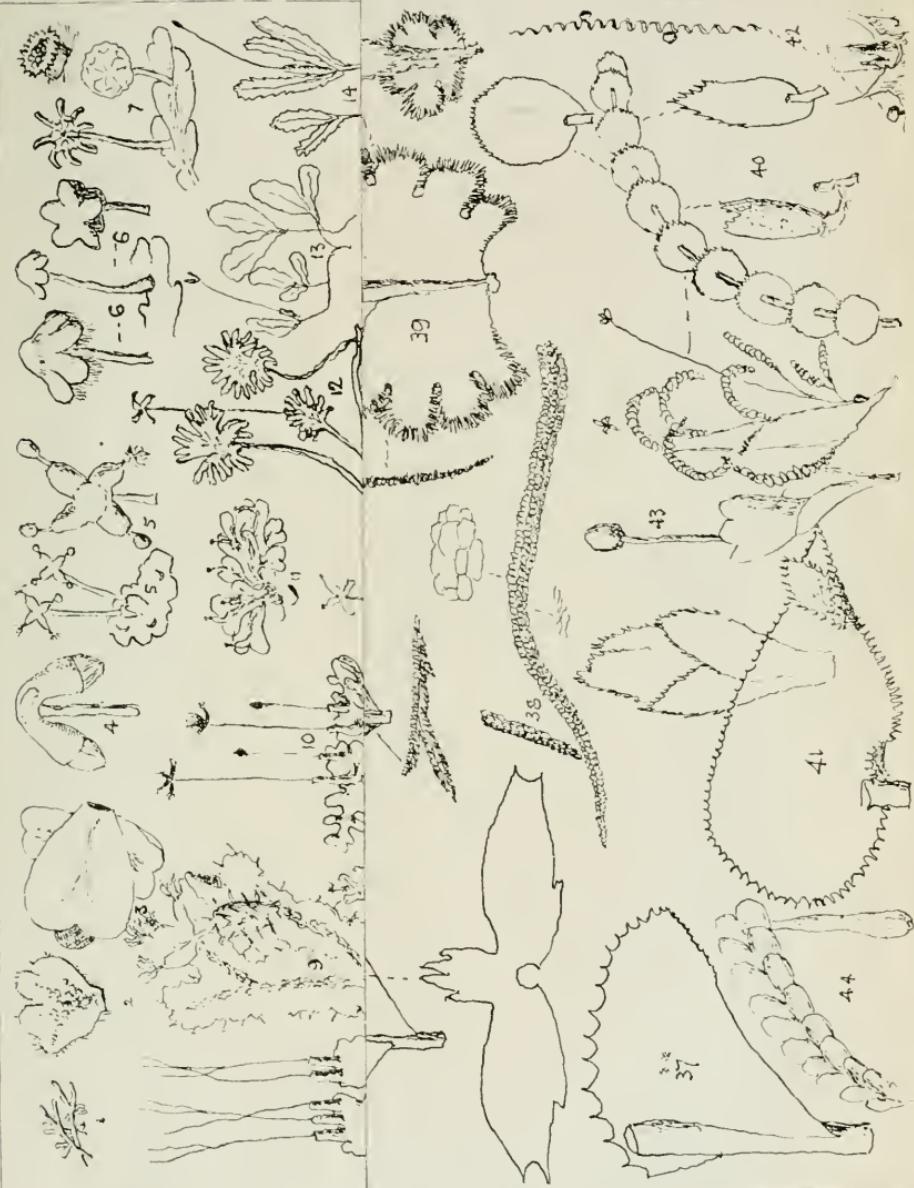
(a) LOBULE PLAIN.

1. *Fruit terminal.*

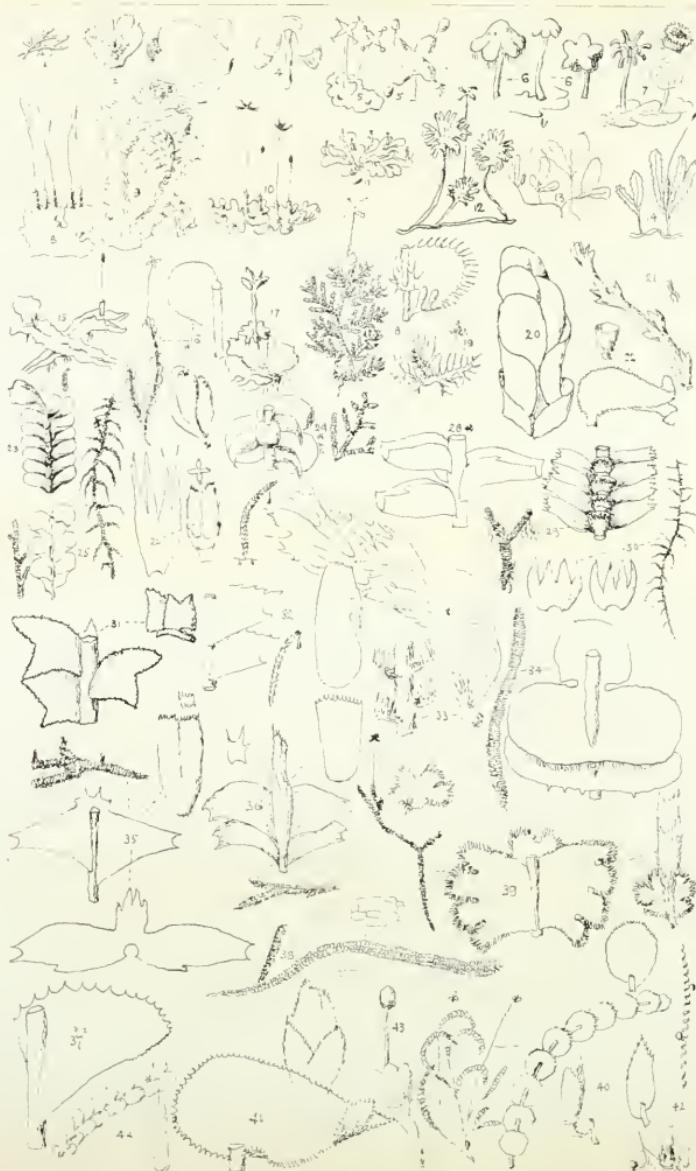
RADULA.—Perianth compressed, in plane with leaves, mouth truncate; no stipules. Fig. 29.

LEJEUNIA.—Perianth obovate, 3-6 plicate; mouth a tubular beak. Fig. 23.

TRICHOCOLEA.—Calyptora and involucral leaves combined; leaves capillary, multifid. Fig. 19.



TYPICAL VICTORIAN HEPATICÆ.



(b) LOBULE INFLATED, GALEATE.

Fruit lateral.

FRULLANIA.—Perianth 3–6 plicate or terete, with a tubular beak. Fig. 24.

POLYOTUS.—Involucral leaves overlying each other, adnate below. Fig. 18.

LIST OF HEPATICÆ ILLUSTRATED AT CORRESPONDING NUMBERS.

1. *Riccia fluitans*, Linn. Blacks' Spur. Hook., Musc. Britt., 213.
2. *Riccia natans*, Corda. Engler, p. 10.
3. *Targionia hypophylla*, Linn. Cook, p. 278; Engler, p. 27.
4. *Hypenantron tenellum*, Corda. (Fimbriaria). Engler, p. 33.
5. *Lunularia cruciata*, Dum. Engler, fig. 19, p. 34.
6. *Reboulia hemispherica*, Raddi. Engler, p. 31.
7. *Marchantia polymorpha*, Linn. Engler, p. 37.
8. *Anthoceros longispirus*, Carr. et Pears. Bastow's Tas. Hep., pl. 43.
9. *Metzgeria furcata*, Ness. Engler, p. 53.
10. *Aneura pinguis*, Linn. (Riccardia), Carr. et Pears. Engler, p. 52.
11. *Blasia pusilla*, L. Hook., Br. Jung., t. 82, 84.
12. *Hymenophyton flabellatum*, Hook. (Symphyogyna, Mont.) Engler, p. 54.
13. *Podomitrium phyllanthus*, Hook. Engler, p. 54.
14. *Symphyogyna hymenophyllum*, Hook. Engler, p. 55.
15. *Steetzia Lyallii*, Wilson, in Hook., t. 68, F.N.Z., ii., 540.
16. *Noteroclada porphyrorhiza*, Mitt. Engler, p. 58.
17. *Fossombronia pusilla*, L. F.N.Z., ii., 163.
18. *Polyotus magellanicus*, Gottsche. (Lepidolæna). Engler, p. 109.
19. *Trichocolea tomentella*, Lindb. Engler, p. 110.
20. *Jungermannia colorata*, Lehmann. (Syn. Hep., 36, 673. Jamiesoniella). Engler, p. 83.
21. *Trigonanthus dentata*, Raddi. (Cephaloziella). Engler, p. 98.
22. *Scapania densifolia*, Nees. Hook., Musc. Exot., t. 36.
23. *Lejeunia sorpallifolia* Sibert. Syn. Hep. 374.
24. *Frullania proboscidiphora*, Tayl. Lond. Journ. Bot., 1846, p. 402.
25. *Radula aquilegia*, Tayl. Syn. Hep., p. 260.
26. *Leperoma scolopendra*, Hook., Musc. Exot., t. 40 (Lepicolea). Engler, p. 108.
27. *Balantiopsis diplophylla*, Tayl. Engler, p. 111.
28. *Isotachis Gunniana*, Mitt. F. Tas., t. 179.
29. *Bazzania novæ-hollandiæ*, Gottsche. Syn. Hep., p. 221.
30. *Lepidozia pendulina*, Hook. Musc. Exot., p. 60.
31. *Acrobolbus cinerascens*, Mitt. Lindl., Syn. Hep., 78 (Podanthe). Engler, p. 86.
32. *Tylimanthus tenella*, Hook. f. et Tayl. Lond. Journ. Bot., 1844, p. 377. Engler, p. 87.
33. *Psilocladia clandestina*, Mitt. F.N.Z., ii., t. 99. Engler, p. 102.
34. *Chiloscyphus conjugatus*, Mitt. Flor. Tas., ii., p. 228.
35. *Lophocolea Tasmanica*, Mitt. Bastow's Tas. Hep., p. 228, pl. 7.
36. *Leioscyphus repens*, Mitt. F.N.Z., ii., t. 97.
37. *Plagiochila strobilifolia*, Tayl. Lond. Journ. Bot., 1844, p. 578.
38. *Zoopsis argentea*, Hook. f. et Tayl. F.N.Z., ii., p. 164.
39. *Temnoma quadrifida*, Hook. Musc. Exot., t. 94.
40. *Adelanthus falcatus*, Mitt., in Journ. Linn. Soc., v. vii., p. 243. Hook., Musc. Exot., p. 89.
41. *Gottschea ciligera*, Hook. f. et Tayl. Lond. Journ. Bot., iii., p. 376.
42. *Anteridium and Archegonium*, *Nardia hæmotosticta*, Engler, p. 79, and elater.
43. *Solenostoma rotata*, Mitt. Hook., Handbk., F.N.Z., p. 753.
44. *Lethosolea Drummondii*, Mitt. F.N.Z., p. 99, fig. 8.

ALTERATIONS IN THE NOMENCLATURE OF SOME
VICTORIAN MARINE MOLLUSCA.

BY J. H. GATLIFF AND C. J. GABRIEL.

(Read before the Field Naturalists' Club of Victoria, 13th July, 1914.)

SOME confusion having arisen through the alteration, during recent years, of the names of several of our Victorian shells, we desire to submit the last accepted names and those previously used, together with explanatory notes on the changes.

PARVITEREBRA HARRISONI, T.-Woods.

1877.—*Mangelia harrisoni*, T.-Woods. P.R.S. Vic., p. 56.1900.—*Raphitoma harrisoni*, T.-Woods. Pritchard and Gatliff, *id.*, vol. xii., n.s., for 1899, p. 179.*Obs.*—This species has caused much diversity of opinion amongst authors as to its generic position. It has been classed in the following genera:—*Euryta*, *Mangelia*, *Daphnella*, *Terebra*, and *Cithara*; but the difficulty has now been overcome by the erection of the genus *Parviterebra* by Pilsbry in 1904 for the reception of it and other similar shells.

PHASIANELLA PERDIX, Wood.

1828.—*Phasianella perdix*, Wood. Index Testaceologicus, Suppl., p. 48, pl. 6, f. 46.1834.—*Phasianella ventricosa*, Quoy and Gaimard. *Astrolabe*, Zool., vol. iii., p. 237, pl. 59, f. 8, 9.1902.—*Phasianella ventricosa*, Quoy and Gaimard. Pritchard and Gatliff, P.R.S. Vic., vol. xiv., n.s., p. 112.*Obs.*—Wood's species appears to have been ignored by most writers, but his figure above cited, although small, depicts our species admirably: we also have a large series of it from the adjoining States, also Western Australia and Tasmania.

MEGATEBENNUS JAVANICENSESIS, Lamarck.

1822.—*Fissurella javanicensis*, Lamarck. Anim. S. Vert., vol. vi., part 2, p. 14.1834.—*Fissurella trapezina*, Sowerby. P.Z.S. Lond., p. 126.1841.—*Fissurella javaniensis*, Lamarck. Delessert, Recueil Coquilles, pl. 24, f. 8 (a) (b) (c).1903.—*Megatebennus trapezina*, Sowerby. Pritchard and Gatliff, P.R.S. Vic., vol. xv., n.s., p. 182.*Obs.*—This is our commonest species of the key-hole limpets. The specimen figured by Delessert appears to be somewhat deformed.

ANAPELLA TRIQUETRA, Hanley.

1843.—*Mesodesma triquetra*, Hanley. P.Z.S. Lond., p. 101.

1856.—*Mesodesma triquetrum*, Hanley. Cat. Rec. Biv. Shells, p. 341, pl. 12, f. 20.
1857.—*Anapa triquetra*, Hanley. H. and A. Adams, Genera, vol. ii., p. 415, pl. 106, f. 5, 5a.

Obs.—This shell has been identified by many Australian writers as a synonym of *Crassatella cuneata*, Lamarck, a figure of the type of which is given by M. E. Lamy in Bulletin No. 4 of the Museum d'Histoire Naturelle, 1912, p. 5; it is there classed as a *Mesodesma*, and is altogether different from *A. triquetra*. It shows a pallial sinus; *A. triquetra* has none.

HEMIDONAX AUSTRALIENSE, Reeve.

1844.—*Cardium australiense*, Reeve. Conch. Icon., vol. ii., pl. 5, f. 24.
1903.—*Donax cardioides*, Lamarck. Pritchard and Gatliff (not of Lamarck), P.R.S. Vic., vol. xvi., n.s., p. 119.

Obs.—This is a distinct species from *H. donaciforme*, Schro., of which *Donax cardioides*, Lam., is considered to be a synonym. We have a typical specimen of the latter species, received from Mr. G. B. Sowerby, London. It has stronger radial sculpture, the umbos are more central, and the colouration is different. We have not found it on our shores, our species being *H. australiense*, although it is much smaller, and might be considered distinct.

TELLINA (ARCOPAGIA) VICTORIAE, nom. mut.

1818.—*Tellina decussata*, Lamarck. Anim. S. Vert., vol. v., p. 352, not of Wood, 1815.
1846.—*Tellina decussata*, Lamarck (not of Wood). Sowerby, Thes. Conch., vol. i., p. 262, pl. 60 in text, pl. 62 on plate, f. 184.
1903.—*Tellina decussata*, Wood. Pritchard and Gatliff (not of Wood), P.R.S. Vic., vol. xvi., n.s., p. 117.

Obs.—The shell found on our coast is not the *Tellina decussata* of Wood, described and figured in his "General Conchology," p. 190, pl. 43, f. 2 and 3, published in 1815, but it is Lamarck's species of the same name published in 1818. We therefore re-name it as above.

GOMPHINA UNDULOSA, Lamarck.

1818.—*Venus undulosa*, Lamarck. Anim. S. Vert., vol. v., p. 606, No. 85.
1903.—*Chione undulosa*, Lamarck. Pritchard and Gatliff, P.R.S. Vic., vol. xvi., n.s., p. 128.
1909.—*Gomphina undulosa*, Lamarck. Jukes-Browne, P. Mal. Soc. Lond., vol. viii., pp. 233-237 and 244.

LASAEA SCALARIS, Philippi.

1847.—*Poronia scalaris*, Philippi. *Zeit. f. Malak.*, vol. iv., p. 72.
1847.—*Poronia parreysi*, Philippi. *Id.*, p. 73.
1847.—*Poronia purpurata*, Philippi. *Id.*, p. 73.
1863.—*Poronia australis*, Souverbie. *Jour. de Conch.*, vol. xi., p. 287, pl. 12, f. 8.
1902.—*Lasaea scalaris*, Philippi. *Hedley, Mem. Austr. Mus.*, vol. iv., p. 321.
1904.—*Lasaea rubra*, Pritchard and Gatliff (not of Montagu). *P.R.S. Vic.*, vol. xvii., n.s., p. 226.
1913.—*Lasaea scalaris*, Philippi. *Suter, Man. N.Z. Moll.*, p. 928.

Obs.—The above species has been considered by many writers to be conspecific with the European *L. rubra*; but, having received specimens of the latter from Mons. Dautzenberg, of Paris, and Mr. Jukes-Browne, of England, we are constrained to consider it a distinct species. Our shell attains to much greater dimensions, and in the adult specimens is usually strongly concentrically ridged; young forms found together with these are generally smooth. *L. scalaris* is covered densely with minute pittings or punctures, a feature not discernible on *L. rubra*.

CYAMIOMACTRA BALAUSTINA, Gould.

1861.—*Kellia balaustina*, Gould. *Boston Proc. Soc. Nat. Hist.*, vol. viii., p. 33.
1908.—*Cyamiomactra nitida*, Hedley. *P.L.S. N.S.W.*, vol. xxxiii., p. 477, pl. 9, f. 19 and 20.
1913.—*Cyamiomactra balaustina*, Gould. *Hedley, P.L.S. N.S.W.*, vol. xxxviii., p. 268.

Obs.—Mr. Hedley, in the "Memoirs of the Australian Museum," 1902, vol. iv., p. 321, placed *Kellia balaustina*, Gould, as a synonym of *Lasaea scalaris*, Phil. In the last reference given above, after seeing the type of Gould's species, he considers it a valid one, and that his own *C. nitida* is absolutely the same.

FISHERIES.—From time to time the Commonwealth Department of Trade and Customs has been publishing the zoological results of the fishing experiments carried out by the s.s. *Endeavour*, under the direction of Mr. H. C. Dannevig. The parts contain a varying number of pages, and are well illustrated. Part 1 of vol. ii (January, 1914) contains a report of 62 pages on Hydroids collected in the Great Australian Bight, by Mr. W. M. Bale, F.R.M.S., illustrated with seven plates. The second part, just issued, is devoted to a report on some mollusca, by Mr. C. Hedley, of the Australian Museum, Sydney.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 14th September, 1914.

Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 50 members and visitors were present.

REPORTS.

A report of the excursion to South Morang on Saturday, 22nd August, was forwarded by the leader, Mr. J. W. Audas, F.L.S., who stated that there had been a fair attendance of members. The day was very fine, and, after visiting the Plenty River, the party decided to walk on to Greensborough, and thus get an earlier train back to town. Along the river-banks the Silver Wattle, *Acacia dealbata*, was in full bloom, and presented a beautiful sight, while a rocky cliff was festooned with *Clematis microphylla*, also in full bloom. On the eastern side of the river a greater variety of vegetation was met with. Three acacias—*A. pycnantha*, Golden Wattle, *A. diffusa*, Spreading Acacia, and *A. acinacea*, Gold-dust Acacia, were found in bloom, the first-named being particularly fine. Some of the gum saplings formed supports for fine growths of the Purple Coral-Pea, *Kennedya monophylla*, which, being in full bloom, afforded a pleasing contrast to the yellow of the acacias. A number of the usual spring flowers were met with, among them being the orchids *Caladenia carneae*, *C. caerulea*, *Diuris maculata*, and *D. sulphurea*. Had the season not been so dry, it is probable better results would have been obtained, as the locality appeared to be a promising one. From some high ground a delightful view of the Diamond Creek valley and the distant ranges was obtained.

A report of the excursion to Alphington on Saturday, 12th September, was given by the leader, Mr. J. Searle, who said that a number of interesting specimens of pond-life had been secured, and several of them were on view under microscopes for the information of members.

ELECTION OF MEMBERS.

On a ballot being taken, Miss Gladys B. Carter, "Kilbride," Heyington-place, Toorak; Miss Amy Fuller, Stanley-grove, Canterbury; Mr. Joseph G. Hollow, Bamfield-street, Sandringham; and Mr. Lionel H. Dawson, 12 Commercial-road, Prahran, were duly elected as ordinary members of the Club.

REMARKS ON EXHIBITS.

Mr. J. Gabriel drew attention to his exhibit of specimens of the polyzoa, *Pedicellinopsis fruticosa*, which he had obtained recently when dredging in the western passage at Western Port Bay. He remarked that this species had been described and named by Hincks in 1884 from specimens obtained at Port Phillip Heads by the late Mr. J. Bracebridge Wilson, and, though he had been dredging about Western Port for some twenty-five years, the specimen under notice was the first that he had obtained. The species is remarkable for its arborescent form and its specialized muscular structure. The polypides are cup-shaped, supported on chitinous tubes with a much-enlarged base, consisting of a muscular core enveloped in a chitinous covering.

Dr. T. S. Hall, M.A., demonstrated a simple method of making small cardboard trays for specimens.

Mr. E. S. Anthony drew attention to his exhibit of aboriginal implements from Tasmania.

Mr. J. Searle drew attention to some egg masses of a species of gnat, obtained during the Alphington excursion, from which had already emerged a number of minute larvæ.

PAPERS READ.

1. By Mr. F. Chapman, A.L.S., entitled "On an Impression of the Fruit of a Casuarina, or Sheoak, in the Newer Basalt of Victoria."

The author said that recently a piece of basalt had been forwarded to the National Museum on which there was an impression such as might have been made by the fruit of some plant. The piece of stone had been picked up on Yandoit Hill, between Daylesford and Newstead, many years ago. As the result of a number of experiments made with the fruits of casuarinas on plasticine, the markings seemed to agree closely with that made by *Casuarina stricta*, the Drooping Sheoak.

In the discussion which followed, Professor Ewart, D.Sc., congratulated the author on his conclusions, but thought it was rather hazardous to definitely fix the species of sheoak represented by the impression.

2. By Mr. P. R. H. St. John, entitled "On the Similarity of *Banksia collina* and *B. spinulosa*."

The author said that many years ago he had noticed the similarity of these two species of Banksia, and had devoted some attention to the question. Specimens of *Banksia collina*, from Emerald, Victoria, and *B. spinulosa*, from Illawarra, New South Wales, were practically identical, and seedlings grown from both forms are indistinguishable. Should his

conclusions be correct, the name *B. spinulosa*, being the older, must stand for both plants.

Prof. Ewart, D.Sc., in remarking on the author's conclusions, said that they showed how necessary it is to study cultural results where doubt existed.

EXHIBITS.

By Mr. E. S. Anthony.—Aboriginal chipped stone implements from Tasmania; also one from London, England.

By Mr. F. G. A. Barnard.—Wild-flowers from One Tree Hill, Bendigo, including *Boronia polygalifolia*, *Eriostemon obovalis*, *Grevillea lanigera*, and *Helichrysum obcordatum*.

By Mr. F. Chapman, A.L.S.—Lava from Yandoit Hill, showing impression of fruit of Casuarina, sp., in illustration of paper; also photograph of series impressions from casuarina fruits.

By Mr. J. Gabriel.—Polyzoa, *Pedicellinopsis fruticosa*, from Western Port Bay.

By Mr. J. Searle.—Specimens of pond-life obtained on Alphington excursion.

By Mr. F. Wisewould.—Wild-flowers from Upper Pakenham, including *Goodia lotifolia*, *Sprengelia incarnata*, and *Diuris maculata*.

After the usual conversazione the meeting terminated.

EXCURSION TO ALPHINGTON.

ONLY four members met at the appointed time for the excursion to Alphington on Saturday, 12th September, but I believe some three or four others came on by a later train, though we did not meet them. Owing to the recent dry weather, the water in the ponds was at a very low level, and one swampy place that generally holds water till December or January was completely dried up. Notwithstanding this, the ponds yielded a great number of interesting specimens, and many bottles were filled with material for home examination. A noticeable feature was the vast numbers of a small ostracod, *Cypridopsis minna*, in one of the pools. In another pool, in which *Myriophyllum* and *Potamogeton* grew thickly, the amphipod *Chiltonia subtenuis* was very numerous. Here, also, we noticed that the frog spawn attached to the weeds appeared to be attacked by a fungus which looked like tufts of cotton-wool; but, in spite of this attack on the Batrachian population, the number of tadpoles swimming in the water was enormous. In another pond, attached to partly submerged twigs, were the egg masses of one of the gnats. These were

sausage-shaped, gelatinous masses, in which the eggs were embedded in a spiral, end to end, round the outer edge. One of these egg masses is exhibited on the table to-night. A number of the eggs have hatched, and in the water is a swarming, wriggling mass of tiny larvæ. The Ceratopogon and Chironous gnats also lay eggs in gelatinous masses—the former in irregular form, the latter in small globular masses, the eggs radiating from the centre. The tube-building rotifer *Melicerta ringens* was seen in numbers on the *Myriophyllum*, and two interesting species of Cladocera were noted—one, *Scapholeberis kingi*, a form described by King in 1851 as *Daphnia mucronata*; the other also described by King as *Moina lemnae*, though he had some doubt as to the genus. This species had escaped the notice of naturalists since King's time until some two years ago I obtained a number of them at Caulfield. These I sent to Prof. G. O. Sars, who re-described the species and placed it in a new genus amongst the Macrothrixidae, naming it *Pseudomoina lemnae*.

The following is a list of the principal species noted:—
Protozoa—*Spirostoma*, *Vorticella*, *Epistylis*; *Volvox*; Coelenterata—*Hydra oligactis*; Turbellaria—*Mesostomum tetragonum*; Planarians; Rotifera—*Melicerta ringens*, *R. vulgaris*, *Asplanchna*; Cladocera—*Daphnia carinata*, *Simocephalus australis*, *Ceriodaphnis*, sp., *Pseudomoina lemnae*, *Scapholeberis kingi*, *Bosmina*, sp., *Chydorus*, *Pleuroxis*; Copepoda—*Boeckella oblonga*, *B. symmetrica*, *B. saycei*, *B. pseudochelæ*, *B. asymmetrica*, *Brunella longicornis*, *Cyclops leuckarti*, *C. australis*, *C. albidus*; Amphipoda—*Chiltonia subtenuis*; Caridia—*Xiphocaris compressa* (?).—J. SEARLE.

“PROTEUS was one of the ancient Greek gods, a son of Neptune, the old sea god, who had the power of changing his shape at will, and in suggestion of the great diversity of its species, the genus *Protea* and the order *Proteaceæ* were named after him. The order *Proteaceæ* contains many plants so apparently different that it is hard for the novice to believe that such plants, presenting so many apparently differing forms, should belong to the same order. Although the flowers of the different genera are very different in appearance, one outstanding feature is prominent, and that is the hard, leathery texture of the mature foliage of almost every species. It would seem as if nature had so allowed these plants to gradually acquire the hardened foliage that they might adapt themselves to hard, hot, and dry climates and soil conditions, and so to sustain life under the most trying circumstances.”—From “The Native Flowers of Victoria,” by E. E. Pescott, F.L.S.

PLATE III.

*C. gianca**C. suberosa**C. stricta**C. austrolyra**C. luehmannii**C. stricta*
ripiæ

F.C. photo.

BASALT-LAVA IMPRESSION OF FRUIT OF CASUARINA.

Lower Figures—Impressions of Fruits of living Casuarinas in plasticine.

ON AN IMPRESSION OF THE FRUIT OF CASUARINA
OR SHEOAK IN THE NEWER BASALT OF VIC-
TORIA.

(With Plate.)

By F. CHAPMAN, A.L.S., Palaeontologist to the National
Museum, Melbourne.*(Read before the Field Naturalists' Club of Victoria, 14th Sept., 1914.)*

A FEW weeks ago a block of basalt lava from Yandoit Hill was submitted to the Museum for determination by Mr. Thomas Smith, of Newstead. Mr. Smith writes, under date 13th July, 1914, as follows:—

"I am sending an impression on a piece of volcanic stone that was picked up by my uncle many years ago on the northern slopes of Yandoit Hill. In the alluvial under the basalt of the hill impressions of leaves have been found, and some of these which I saw I remember as having a likeness to Banksia leaves and the rather long and narrow leaves of eucalyptus; but I was too young at the time, and so cannot say for certain. The stone with the impressions which I am forwarding was, however, picked up on a spot beneath which there must be a considerable thickness of basalt, so that the organisms that formed the impression must have existed after at least the first eruption of the old volcano."

At first sight the impression in this piece of lava was rather puzzling. It certainly seemed organic, on account of its regular marking. No animal structure suggested itself as likely to have formed this impression. My attention was thus naturally directed to the plants. The only plant structure which could have formed the impression appeared to be that of a fruit; and, since Mr. Smith mentioned in the letter quoted that leaves like *Banksia* and *Eucalyptus* had been found in the alluvial under the basalt of the hill, I thought of the cones of *Banksia*. Upon taking impressions of these cones the result was negative, in that the impressions of the cortical scales were lozenge-shaped. Then *Casuarina* suggested itself, and on taking impressions of the fruit of this genus the likeness was seen to be perfect.

It may here be noted that plasticine offers a ready and effective medium for obtaining impressions of fossils, and this material was used in the present instance. The fruits first examined for comparison in this case were from *Casuarina stricta*, or *quadrivalvis*, by which latter name, although not the older, it seems more generally known. In order to arrive at a more precise determination, I examined a series of fruits at the National Herbarium, with the result that the impression was seen to be nearest to that formed by *Casuarina stricta*, the

Drooping Sheoak, and with this determination Mr. Tovey, of the National Herbarium, agrees.

Judging from experiments, the fruit was lying with the stalk end downwards, the lava receiving a light impress of the apical end of the fruit, showing the elliptical pits of one ring perfectly, and an inner imperfectly, whilst the innermost one or two rings are unrepresented, owing to their depressed position. The impression matches that of an old or ripe fruit of the *Casuarina stricta* type.

PREVIOUS RECORDS OF THE OCCURRENCE OF CASUARINA BENEATH THE NEWER BASALT.

In 1905 the writer described (*Vict. Nat.*, vol. xxi., p. 173) portions of tree-stumps found under 90 feet of basalt at Burnley quarries, in the alluvium of the ancient Yarra. On microscopic examination the wood proved to belong to *Casuarina* (*C. stricta*, Aiton, the Drooping Sheoak). The wood in this case showed "no greater alteration than a piece of Irish Bog-oak, although it has been in actual contact with the lava."

Remains of wood, probably of *Casuarina*, have also been recorded from under the Newer Basalt, at the Clifton Hill quarry, by Mr. R. W. Armitage (*Vict. Nat.*, vol. xxvii., 1910, pp. 21-30, pls. 3, 4), and that author gives an exhaustive summary of recorded plant-remains found associated with lavas in different parts of the world.

DESCRIPTION OF THE LAVA-BLOCK, AND REMARKS THEREON.

The piece of lava on which the impression occurs is convex on the impressed side, and conveys the idea that it was moulded in a gutter or hollow in which the fruit was lying. The uppermost or flat side shows a fluidal or semi-ropy structure, and can be referred to the pahoehoe type, as described by Dana. In order to ascertain the nature of the lava-structure, this block was chipped at one end. The broken surface shows that even in this thin flow there is evidence of two layers, a cooled surface being developed midway in the mass, which, altogether, is less than 6 centimetres thick. The lava is inclined to be spongy through the inclusion of vesicles, and showing a general "bread-crust" structure, which probably points to its nearness to the centre of eruption.

A noteworthy question as to the vegetation being contemporaneous during the volcanic period arises out of Mr. Smith's remark that "the organism that formed the impression must have existed after at least the first eruption of the old volcano." We here seem to have evidence of a resuscitation of the vegetation of the plains and creeks of the

volcanic field within a short period of time. As a matter of fact, there probably existed a kind of intervolcanic flora, establishing itself through the intermittent phases of the volcanic activities of this presumably Pleistocene period. Considerable light is thrown on this question by Dana's evidence from the present-day lava-fields of Kilauea and Mount Loa, which would suggest the proximity of the rough scoriaceous type of flow known as "aa" alongside the smooth lava-flow, and, perhaps linked up by the intermediate form, the ropy lavas. In his "Characteristics of Volcanoes," 1890, p. 242, J. D. Dana says:—"The 'aa' field, owing to its crevices and shaded recesses, retains moisture, and decomposition at surface early commences, which favours germination of seeds; and, as I am informed by Mr. Baker, the stream often becomes forest-covered when the pahoehoe alongside remains bare."

An interregnum of a luxuriant flora during volcanic episodes is well known in other parts of the world, as, for example, in the familiar cases of the volcanic plateaus of Antrim, in the north of Ireland, and of the Inner Hebrides.

In this way we have revealed a great struggle for existence, by the vegetation and other life of the lava-fields, waged against the tremendous odds of a fierce volcanic energy, which every now and again devastates whole districts of the established vegetation.

ON THE SIMILARITY OF *BANKSIA SPINULOSA* AND *B. COLLINA*.

By P. R. H. ST. JOHN.

(*Read before the Field Naturalists' Club of Victoria, 14th Sept., 1914.*)

NOTICING the similarity of these two Banksias, I was induced to make an investigation into their claim to rank as separate species, and an examination of the plants in the forest and those cultivated in the Melbourne Botanic Gardens warrants the conclusion that they are identical. This result is well supported by Mr. F. M. Bailey, F.L.S., Government Botanist of Queensland, who remarks ("Qld. Fl.," vol. iv., p. 1,360) :—"The typical form of *B. spinulosa*, Smith, so far as at present known, is confined to New South Wales; but, from the examinations of Queensland specimens of *B. collina*, and the New South Wales one of *B. spinulosa*, I find nothing to keep the two as distinct species." Referring to these remarks, however, Mr. J. H. Maiden, F.L.S., Government Botanist of New South Wales, concludes by saying :—"As far as New South Wales specimens are concerned, the two species seem to be sufficiently different" ("F. Fl. of N.S.W.," vol. iv., part 8); but, in an additional note, he makes the following

reference to the leaves of *B. collina* :—“ Note that there is a good deal of variation in the margin of the leaves—exceptionally, they may be entire ” (“ F. Fl. of N.S.W.,” vol. iv., part 8).

The specimens shown of *B. collina*, collected by myself in the Emerald district, Victoria, match those of *B. spinulosa* collected by Mr. R. T. Baker, F.L.S., about 18 miles south of Sydney, and also that figured in the “ Forest Flora of New South Wales,” vol. iv., part 9.

The original descriptions of the two species are given for comparison, to which, from observations made during a number of years, I have been able to add some further characters. I have also included notes given by Bentham and J. H. Maiden in their respective writings. A description of the seedlings is also given, with the synonymy of the combined form.

BANKSIA SPINULOSA, Smith.

(“ Bot. Nov.-Holl.,” 13, t. 4, 1793.)

A tall shrub, glabrous, or the young branches minutely pubescent [or villous—P. R. H. St. J.]

Leaves.—Narrow linear, notched at the end, with a prominent point in the notch, and often bordered towards the end with two or three small teeth on each side, otherwise entire, with revolute margins and the midrib prominent underneath, $1\frac{1}{2}$ to 3 inches long [some forms showing the white under surface, with dentate margins, as in *B. collina*—P. R. H. St. J.]

Spikes.—Ovoid, 2 to 3 inches long, or rarely cylindrical and twice as long [more usually cylindrical—J. H. Maiden].

Bracts.—With broad, shortly acuminate, silky pubescent tips.

Flowers.—Yellow [or dark purple—P. R. H. St. J.] larger than *B. ericifolia* [?—P. R. H. St. J.]

Perianth.—Silky, the tube nearly 1 inch long.

Style.— $1\frac{1}{2}$ to $1\frac{1}{2}$ inches long [hooked—P. R. H. St. J.], often purple, with a short stigmatic end not thicker than the style.

Fruiting Cone.—Cylindrical.

Capsule.—Scarcely protruding, glabrous [thick and smooth—Bentham, “ Fl. Aus.,” v., 547].

BANKSIA COLLINA, R. Brown.

(Trans. Linn. Soc., x., 204, 1809.)

A tall, erect shrub, attaining 8 to 10 feet; the young branches tomentose or villous.

Leaves.—Linear [and narrow linear—P. R. H. St. J.], much broader than in *B. spinulosa*, and always [not always—P. R. H. St. J.] showing the white under surface, the margins recurved, more or less denticulate or rarely quite entire, $1\frac{1}{2}$ to 3 inches long.

Spikes.—Oblong or cylindrical, 3 to 6 inches long.

Bracts.—With broad, flat, or scarcely acuminate ends [silky pubescent tips—P. R. H. St. J.]

Flowers.—Yellow or dark purple.

Perianth.—Silky, 1 inch long.

Style.— $\frac{1}{2}$ inch longer than the perianth, hooked, with a very small stigmatic end [dark purple or yellow—P. R. H. St. J.]

Fruiting Cone.—Cylindrical like *B. ericifolia*.

Capsule.—Thick and scarcely protruding as in that species (*B. ericifolia*) [but quite glabrous—Benth., “ Fl. Aus.,” v., 548].

ADDITIONAL NOTES ADDED BY THE PRESENT WRITER.

Stipules.—Linear, acute, villous.

Dissepiment.—Dark brown, similar in both forms.

Seeds.—Black, flat, and pointed, with a broad, dark brown, semi-transparent wing.

Seedlings.—

Cotyledons.—Two, rarely four, oblong, $\frac{3}{8}$ of an inch long, sessile.

Leaves.—The first pair are opposite, the others alternate, sessile, linear, $\frac{1}{2}$ to 2 inches or more in length, tapering to the base, sharply serrated, and terminating in one, two, or three fine points, margins slightly recurved, upper surface smooth and green, lower surface white, tomentose.

SYNONYMS.

Banksia collina, R. Brown.

B. denticulata, Dum-Cours (formerly the synonym of *B. spinulosa*).

B. ledifolia, A. Cunningham.

B. Cunninghamii, Sieber.

B. littoralis, Lindley.

B. prionophylla, F. v. Mueller.

B. marginata, var. *macrostachya*, Hort.

HABITAT OF THE COMBINED FORMS.

Victoria; found generally in mountain districts, but occasionally on the neighbouring plains, as at Foster (in swamps). New South Wales and Southern Queensland.

The seedlings exhibited were raised from seed obtained from both forms, and are indistinguishable. Some of the specimens of the mature plants show distinctly leaves of both types on the one branch.

These facts make it clear that there is no essential difference between the two forms, either in the seedling or mature stage, and the name with the right of priority is undoubtedly *B. spinulosa*.

ORNITHOLOGISTS' UNION.—The next session of the R.A.O.U. will be held in Melbourne, commencing on Wednesday, 4th November, and a party is being organized to spend a fortnight at Mallacoota Inlet for field observation. Intending excursionists should communicate with the hon. secretary, Mr. A. C. Stone, 71 Tivoli-road, South Yarra.

BOOK NOTICES.

THE NATIVE FLOWERS OF VICTORIA. By E. E. Pescott, F.L.S., F.R.H.S. 118 pp. ($7\frac{1}{2}$ x $4\frac{3}{4}$). With 4 coloured plates and 56 photo.-engravings. Melbourne: Geo. Robertson and Co. 1914. 3s. 6d.

In this handy volume the author has called attention in a delightful manner to a large number of our notable Victorian trees, shrubs, and plants, for, judging by the very complete index given, nearly 500 species must be mentioned. The want of such a volume has long been felt, and the present work seems to admirably fill the want. It is neither too technical nor too popular, consequently the reader turning to it for information will be encouraged to dip further and learn more about the plants around him. The work is, to some extent, designed to encourage the cultivation of native plants in our gardens, and Prof. Ewart, in a short introduction, points out that many of our native plants offer great possibilities to the horticulturist. The plants are treated in more or less related groups, and a fair number of the species mentioned are illustrated by photo.-engravings, most of which are good—in fact, many of them are exceedingly fine—and Mr. A. J. Relph, who is responsible for most of them, is to be congratulated on his successful photographs. The coloured illustrations are hardly of equal merit, lacking the proper shade of colour in several species. The chapter on growing the native flora is sure to be appreciated, for what has already been published on that point is extremely meagre. We trust the volume will have a large sale, and a second edition be required, when a few slight imperfections could be remedied.

THE BUTTERFLIES OF AUSTRALIA: a Monograph of the Australian Rhopalocera. By G. A. Waterhouse, B.Sc., B.E., F.E.S., and Geo. Lyell, F.E.S. 270 pp. (11 x $8\frac{1}{2}$), with 43 plates (4 coloured). Sydney: Angus and Robertson. 1914. £2 2s.

In this fine quarto volume the authors have given the results of many years' study of Australian butterflies. Being the possessors of two of the finest private collections of these insects, they have been able to devote great attention to the proper arrangement of the groups, and, by a slightly different naming of the veins and areas of the wings and attention to other structural details, claim to have established a system of classification which will bear close criticism. The volume is one more for the systematic collector than for the mere casual lepidopterist. Each species and sub-species is fully described, and every insect is figured, hence the plate index covers 18

pages and contains 888 entries. A systematic index of 4 pages gives all the species, sub-species, and forms, the former amounting to 332, while the sub-species and forms number about 200, of which one-fourth are new. It is a pity that in such a mass of names the families and genera were not printed in more distinctive type. A number of new genera have been introduced; thus, our well-known *Xenicas* are now arranged under the genera *Argynnina*, *Oreixenica*, and *Xenica*. Another feature is the introduction of trinomials—perhaps in these days of minute specialization unavoidable; thus *Xenica lathoniella* becomes *Oreixenica lathoniella lathoniella*, with three other new sub-species, *O. l. herceus*, *O. l. laranda*, and *O. l. latialis*, while our familiar "Painted Lady" must now be labelled *Pyrameis cardui kershawi*. Considerable attention has been paid to the grouping of the "skippers," a family which has hitherto been scantily treated by most writers. More especially for the benefit of readers in other parts of the world, the work is provided with a good key map of Australia, on which all the localities mentioned throughout the volume will be found, while, in order to save space, the months in which the various species appear are indicated by figures instead of words. So much space is occupied with the detailed descriptions of the individual insects that it has not been possible to give much information about the earlier stages of each species; these details are therefore generalized under each family. The feature of the work, however, is the magnificent series of plates. Most of these are the result of photographs of the specimens, and the process work is so good that one can easily see the gradations in colour in the various species—in fact, in many cases, if one were to imagine the printing to be brown instead of black, he would see the insect in its true colours. The coloured plates, four in number, are especially good. One of them is devoted to *Tisiphone joanna*, Butler, and its variations, from Port Macquarie, an insect closely allied to that so long known as *Epinephile abeona*, the handsome black and brown species of our mountain ranges, which, however, must now be known as *T. abeona albifascia*, Waterhouse, *T. abeona abeona* being confined to New South Wales. The others depict some of the smaller and lesser known "browns," "blues," and "skippers." In addition to the systematic portion of the volume, much valuable information is given as to previous works on Australian butterflies, the anatomy of the group, typical larvæ and pupæ, collecting and preserving, thus making it a very valuable addition to the works on Australian natural history. While references are given to the original description of each species, it is a pity, where so many changes of names have been made, that little reference has been made

to previous synonyms; thus, the name *Epineophile* does not appear even in the index. It is to be hoped that the authors will be well repaid for the great expense the work must have involved, while the publishers, and especially the printers, W. C. Penfold and Co. Ltd., Sydney, are to be congratulated on the excellent way in which they have carried out their share of the undertaking. Would that some lepidopterist would deal with our moths in the same exhaustive manner!

THE CUP MOTH.—The larvae of this moth are particularly numerous on the eucalypts, both young and old, at the present time. During a recent ramble in the Lilydale district it was almost impossible to pick a small branch without finding one or two larvae on it.—F. G. A. B.

ABOUT BIRDS.—Mr. Tom Fisher, of Ercildoune, near Waubra (Ballarat district), contributed some interesting bird notes to the Nature Column of the *Argus* of Friday, 2nd October. He says:—"The Spine-billed Honey-eaters, *Acanthorhynchus tenuirostris*, are always numerous here throughout the year, and I have on many occasions seen their nests. They are particularly fond of the red-flowered *Pyrus japonica*, and it was in these shrubs that I generally found their nests, and always in September or early October, when the bushes were in full bloom, so that the birds did not have to seek far for honey. In fact, they could reach the flowers from the nest. On several occasions I also found late nests in the wistarias, which grow in such profusion here. These nests, too, were built while the plants were in full bloom. It occurred to me at the time that the birds displayed a thorough knowledge or instinct in the choice of locality, so that abundance of nectar was to be had for feeding their young. The nests were never more than 3 feet or 4 feet from the ground. Both the White-cheeked and White-bearded Honey-eaters choose the thick clumps of bracken ferns on the hillsides for building, and make their nests about 2 feet from the ground, and not infrequently half a dozen nests quite close to each other. These birds always go to the ferns to roost at night, and gather in small flocks for that purpose. Two families of young coots have come to light this week, almost a month earlier than usual, and already we have become quite friendly. I think they are the most pleasing little birds that swim. I like the patient care the old ones take of them, always on the alert for danger, and still very trustful when they know you. The Reed Warblers are back once more, quite up to time again, and the reed-beds are ringing with music from morning until night."

Mr. F. G. A. Barnard remarked that he was informed a few days before that a pair of Black Swans had been seen on the Lower Yarra, among the shipping, opposite the Australian Wharf, on several occasions recently, and that they appeared quite unconcerned about the passing traffic.

EXHIBITS.

By Mr. F. Cudmore.—Aboriginal stone implements from Avoca Station, Wentworth, N.S.W.

By Mr. J. A. Kershaw, F.E.S., on behalf of the National Museum.—Victorian cockroaches in illustration of Dr. Shaw's paper—viz., *Polyzosteria magna*, Shaw; *Platzosteria brigitæ*, Shaw; *P. pullata*, Shaw; *Euzosteria metallica*, Shaw; *Penesthia australis*, Burm.; and *Zonioploca flavocincta*, Shaw.

The main exhibits consisted of wild-flowers, which are recorded in a separate report.

After the usual conversazione the meeting terminated.

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As usual, the October meeting of the Club was devoted principally to the annual exhibition of wild-flowers; but seldom in the long series of displays made by members of the Club have the flowers been representative of such a small portion of Victoria as on the present occasion. Owing to the exceedingly dry winter and spring in the central and northern portions of the State, most of the flowers were obtained from the south and east of the metropolis. A noticeable effect of the dry weather was the poor display of *Tetratheca ciliata*, Pink Eyes, bunches of which usually brighten the exhibitions. Fortunately, fine displays from cultivated plants were made by Mr. J. Cronin, Director of the Melbourne Botanic Gardens; Mr. E. E. Pescott, Principal of the Horticultural Gardens, Burnley; and a smaller number by Mr. Hugh Anderson, of Tooronga House, Hawthorn, which, besides providing exhibits to look at, demonstrated the fact that a large number of our native plants can be successfully cultivated in our gardens if given the necessary attention.

The collection from the Botanic Gardens comprised blooms of fifty species of Victorian plants, among which may be mentioned:—*Leptospermum myrsinoides*, Pink Tea-tree; *Livistona australis*, Australian Cabbage-Palm; *Kunzea cordifolia*, White Kunzea; *Cassia australis*, Southern Cassia; *Callistemon salignus*, Willow Bottle-brush; *Styphandra glauca*, Blue Spray; *Calythrix Sullivani*, Grampian Fringe-Myrtle; *Bauera rubioides*, Wiry Bauera; *Prostanthera melissifolia*, Balm Mint-bush; *P. nivea*, Snowy Mint-bush; *Phebalium Billardieri*,

Satin-wood *Phebalium*; *Swainsona Greyana*, Pink *Swainsona*; *Clematis aristata*, var. *Dennisæ*, Pink-flowered Greater *Clematis*; and *Boronia pinnata*, Feathery *Boronia*.

Included in about thirty species from the Burnley Gardens were:—*Prostanthera nivea*, *P. Sieberi*, *Grevillea oleoides*, var. *dimorpha*, *G. aquifolium*, *G. alpina*, *G. linearis*, *G. lavandulacea*, *Pimelea flava*, *Acacia saligna*, *Swainsona Greyana*, &c.

Other exhibits were made as follows:—

By Mr. Hugh Anderson.—About 30 species collected between Cranbourne and Grantville, including *Aotus villosa*, *Aster stellulatus*, var. *lyrata*, *Leptospermum myrsinoides*, and *Ricinocarpus pinifolius*. Among the cultivated plants from Hawthorn were *Tecoma australis*, *Acacia pycnantha*, *Prostanthera rotundifolia*, *Calythrix Sullivani*, *Cassinia arcuata*, *Tetratheca ciliata*, *Eriostemon myoporooides*, *Goodia lotifolia*, and *Grevillea alpina*.

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By Mr. A. D. Hardy, F.L.S.—Specimens of parasitic plants from Christmas Hills—*Loranthus pendulus* on *Acacia melanoxylon* and *Cassytha melantha* on *Eucalyptus polyanthemos*.

By Mr. T. S. Hart, M.A.—About 25 species from Creswick and Rocklyn, including *Podolepis acuminata*, *Pultenaea daphnoides*, &c.

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In addition to the flowers, a very fine display of dried mosses was made by Mr. J. R. Murdoch, of Parkville, whose collection comprised specimens from many parts of the world, such as Mexico, Vancouver, West India Islands, South Africa, India, New Hebrides, Great Britain, New Zealand, and even Siberia.

EXCURSION TO LILYDALE.

FOURTEEN members took part in this excursion on Saturday, 10th October, and were rewarded with a fine and cool afternoon. On arrival at Lilydale the walk was commenced in the direction of the Cave Hill quarry. The chief features of this fine section in the Yeringian series, or upper division of the Silurian, were pointed out, and by the number and variety of interrogations it was evident that the members of the party were interested in the many geological features around them. The steep dip of the limestone was noted, and in one part of the exposed face a definitely arched curve was seen, suggestive of an anticline, the eastern limb of which would be lost under the overburden of basalt and rubble. One would like to know the depth of the limestone from the floor of the quarry, beneath which there appear to be indications of another cave. Hammers were quickly at work, and many fossils extracted from the limestone. Amongst these were:—*Cyathophyllum*, sp.; *Favosites grandipora*, Eth. fil.; Stromatoporoids of several genera, some showing the “Caunopora” condition, due to the presence of commensal organisms, lately held by R. Kirkpatrick to belong to chætopod worms; *Cyclonema lilydalensis*, Eth. fil.; *Eumphalus northi*, Eth. fil., sp., and isolated opercula. The occurrence and formation of dendrites and dolomitized limestone were duly remarked upon, and the way was then taken to the outer edge of the quarry, where the overlying older volcanic lava was seen. Some of the lava has here been completely changed into a whitish claystone, probably due to local percolation of water, whilst in other places the rock still

retained its igneous character and showed good "bomboidal" weathering. On the eastern slope of the hill the quartzites and quartz conglomerates were located, and hammers tested upon them, to the detriment of the hammers. Crossing over to the road by a bridge, and proceeding up the old Melbourne road to Crater Hill, the members of the party examined the tuffaceous crater-like depression, whilst a trio of kookaburras examined the party from a neighbouring fence. The delicate green foliage of the Osage Orange trees, *Maclura aurantiaca*, at the side of the road, gave a touch of spring to the surroundings, and contrasted pleasingly with the Indian-red colour of the tuff deposits exposed in the sides of the road-cutting. The return was made to the station in good time to catch the 5.30 p.m. train to town.—F. CHAPMAN.

"ECONOMIC GEOLOGY AND MINERAL RESOURCES OF VICTORIA."—This pamphlet of 36 pages, by Mr. H. Herman, B.C.E., F.G.S., Director of the Geological Survey of Victoria, was originally compiled as portion of the "Victorian Handbook" for the British Association meeting in August last. It has now been issued as Bulletin No. 34 of the Geological Survey, and can be obtained from the Mines Department at a cost of one shilling. It contains a large amount of valuable information, and is illustrated with two coloured maps, in addition to other maps and diagrams. The plate showing the parallel reefs of Bendigo is particularly striking.

WERRIEBEE GORGE.—Among the recent publications of the Geological Survey of Victoria is a "Geological Sketch Map of the Werribee Gorge and Adjacent Country." It is on the scale of 1 mile to 1 inch, and covers an area of 72 square miles. It has been compiled from manuscript maps by R. Daintree, C. S. Wilkinson, R. A. F. Murray, and C. C. Brittlebank, and also Quarter Sheet No. 12 N.E. (published in 1868). Ten different formations are shown by as many tints, and aneroid heights of many points are given.

SCENERY PRESERVATION.—The report for 1913-14 of the New Zealand Scenery Preservation Branch of the Lands and Survey Department, recently issued, records a smaller area than usual added to the reserves during the year, the increase being only 3,000 acres, but, as the amount of land now set apart for the purpose of preserving scenery totals some 214,000 acres, the Dominion is to be congratulated on such a forward movement. It is gratifying to note that several private citizens have presented areas of land to the Government in order to add to existing reserves or to secure certain beauty spots from destruction. Surely it is high time Victoria made some effort to follow New Zealand's lead.

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EXCURSION TO LILYDALE.

FOURTEEN members took part in this excursion on Saturday, 10th October, and were rewarded with a fine and cool afternoon. On arrival at Lilydale the walk was commenced in the direction of the Cave Hill quarry. The chief features of this fine section in the Yeringian series, or upper division of the Silurian, were pointed out, and by the number and variety of interrogations it was evident that the members of the party were interested in the many geological features around them. The steep dip of the limestone was noted, and in one part of the exposed face a definitely arched curve was seen, suggestive of an anticline, the eastern limb of which would be lost under the overburden of basalt and rubble. One would like to know the depth of the limestone from the floor of the quarry, beneath which there appear to be indications of another cave. Hammers were quickly at work, and many fossils extracted from the limestone. Amongst these were:—*Cyathophyllum*, sp.; *Favosites grandipora*, Eth. fil.; Stromatoporoids of several genera, some showing the “Caunopora” condition, due to the presence of commensal organisms, lately held by R. Kirkpatrick to belong to chaetopod worms; *Cyclonema lilydalensis*, Eth. fil.; *Eumphalus northi*, Eth. fil., sp., and isolated opercula. The occurrence and formation of dendrites and dolomitized limestone were duly remarked upon, and the way was then taken to the outer edge of the quarry, where the overlying older volcanic lava was seen. Some of the lava has here been completely changed into a whitish claystone, probably due to local percolation of water, whilst in other places the rock still

retained its igneous character and showed good "bomboidal" weathering. On the eastern slope of the hill the quartzites and quartz conglomerates were located, and hammers tested upon them, to the detriment of the hammers. Crossing over to the road by a bridge, and proceeding up the old Melbourne road to Crater Hill, the members of the party examined the tuffaceous crater-like depression, whilst a trio of kookaburras examined the party from a neighbouring fence. The delicate green foliage of the Osage Orange trees, *Maclura aurantiaca*, at the side of the road, gave a touch of spring to the surroundings, and contrasted pleasingly with the Indian-red colour of the tuff deposits exposed in the sides of the road-cutting. The return was made to the station in good time to catch the 5.30 p.m. train to town.—F. CHAPMAN.

"ECONOMIC GEOLOGY AND MINERAL RESOURCES OF VICTORIA."

—This pamphlet of 36 pages, by Mr. H. Herman, B.C.E., F.G.S., Director of the Geological Survey of Victoria, was originally compiled as portion of the "Victorian Handbook" for the British Association meeting in August last. It has now been issued as Bulletin No. 34 of the Geological Survey, and can be obtained from the Mines Department at a cost of one shilling. It contains a large amount of valuable information, and is illustrated with two coloured maps, in addition to other maps and diagrams. The plate showing the parallel reefs of Bendigo is particularly striking.

WERRIEE GORGE.—Among the recent publications of the Geological Survey of Victoria is a "Geological Sketch Map of the Werribee Gorge and Adjacent Country." It is on the scale of 1 mile to 1 inch, and covers an area of 72 square miles. It has been compiled from manuscript maps by R. Daintree, C. S. Wilkinson, R. A. F. Murray, and C. C. Brittlebank, and also Quarter Sheet No. 12 N.E. (published in 1868). Ten different formations are shown by as many tints, and aneroid heights of many points are given.

SCENERY PRESERVATION.—The report for 1913-14 of the New Zealand Scenery Preservation Branch of the Lands and Survey Department, recently issued, records a smaller area than usual added to the reserves during the year, the increase being only 3,000 acres, but, as the amount of land now set apart for the purpose of preserving scenery totals some 214,000 acres, the Dominion is to be congratulated on such a forward movement. It is gratifying to note that several private citizens have presented areas of land to the Government in order to add to existing reserves or to secure certain beauty spots from destruction. Surely it is high time Victoria made some effort to follow New Zealand's lead.

AUSTRALIAN BLATTIDÆ.

PART I.—NOTES AND PRELIMINARY DESCRIPTIONS OF NEW SPECIES.

BY ELAND SHAW, M.R.C.S.

(Read before the Field Naturalists' Club of Victoria, 12th Oct., 1914.)

THE National Museum, Melbourne, recently placed in my hands for determination a number of Australian BLATTIDÆ, and amongst them are some new species. In my own collection there are also several species which I consider to be new, and it had been my intention to have included them all in a more extended paper which has been in preparation for some time. Circumstances, however, prevent my going on with this for the moment, and, as it is advisable that the publication of the descriptions of some of the new species should not be delayed, the present paper is written; and, the work being done hurriedly, I crave indulgence for the many faults which it contains. I wish to express my thanks to my friend Mr. F. P. Spry for kindly reading the proof for me in my absence, and I hope to deal with the rest of the material under consideration on my return from Papua.

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The expression "an immature" applied to Orthoptera I use to signify the insect in any stage after emergence from the egg up to its last moult.

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Blatta circumducta, Walk., Cat. Blatt. B. M., Suppl., p. 142 (1869).

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Above dull piceous, smooth, with a faint shagreening towards the margins. Stigmata well marked; below rufo-stramineous; ocelliform spots present. Antennæ ochreous. Thoracic tergites above with margins not reflected; beneath rufo-stramineous, deepening in colour towards the margins, and furnished with numerous small fuscous maculæ. Legs rufo-fuscous. Spines of the tibiae bi-seriately arranged. Supra-anal lamina—♂ quadrate, slightly emarginate, posterior third brownish; ♀ compressed, deeply emarginate. Cerci short, flattened, blunt at the apex, ochreous with brownish margins. Subgenital lamina—♂ sub-quadrata, styles lateral, incurved, brownish, tipped with ochreous; ♀ valves rufo-stramineous. In both sexes the supra-anal lamina is considerably shorter than the sub-genital.

Length.—♂, 46 mm. : ♀, 46 mm.

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Purplish-bronze above, shot with green. Greenish-bronze below. Head greenish-bronze. Antennæ greenish-piceous. Margins of thoracic and abdominal tergites incrassated, the former scarcely reflexed. Coxæ not margined with ochreous. Extreme tips of the femora above and below ochreous. Stigmata very distinct. Supra-anal lamina—♂ quadrate;

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Length.—♂, 22.5 mm.; ♀, 23 mm.

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Habitat.—Mount Erica, Baw Baw, Victoria, Australia (Mr. E. O. Armytage).

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Piceous, nitid. Thoracic tergites with some impressed dots, somewhat scabrous laterally, most marked at the posterior angles of the metanotum. Rudiments of the elytra separated from the mesonotum for rather more than one-third of their length on the inner side, sub-acuminate. Antennæ brown, except the basal joints, which are piceous. Abdominal tergites 1 to 5 scabrous laterally; 6 and 7 with the posterior two-thirds scabrous. Lateral margins of the 7th abdominal tergite serrate. Supra-anal lamina, ♂ and ♀, emarginate and denticulate. Cerci longer than the lamina in ♂, of about the same length in ♀; tipped with rufo-fuscous. Legs piceous, extreme margins of the posterior coxae edged with rufo-fuscous. Tarsi with the distal joint and unguis rufo-fuscous.

Length.—♂, 16 mm.; ♀, 19 mm.

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Habitat.—Victoria, Australia.

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The Victorian Naturalist.

VOL. XXXI.—No. 8.

DECEMBER 10, 1914.

No. 372.

FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 9th November, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 50 members and visitors were present.

CORRESPONDENCE.

From Mr. P. R. H. St. John, thanking members of the Club for their kindness to him during his indisposition on the occasion of the excursion to Yering Gorge on Cup Day.

REPORTS.

A report of the excursion to Pakenham on Saturday, 17th October, was made by one of the leaders, Mr. F. Wisewould, who stated that an enjoyable day had been spent, and the visitors were greatly impressed with the scenery of the locality.

In the absence of the leader, Mr. P. R. H. St. John, Dr. C. S. Sutton made a brief report on the excursion to Yering Gorge on Cup Day. The excursion was largely attended, and those participating spent an enjoyable outing. The locality, by reason of the lateness of the season and the dry weather, proved uninteresting to those botanically inclined.

At the instigation of Mr. F. Pitcher, a hearty vote of thanks was accorded Messrs. Wisewould and Keble for their kindness in providing vehicles and refreshments for those taking part in the excursion to Pakenham on 17th October.

ELECTION OF MEMBERS.

On a ballot being taken, Miss M. Bryant, 12 Tooronga-road, East Malvern, and Miss Olive Holttum, 225 Glenferrie-road, Malvern, were duly elected as ordinary members of the Club, and Mr. F. Beuhne, Tooborac, as a country member.

GENERAL BUSINESS.

Mr. E. E. Pescott drew attention to the presence of Miss F. Sulman, a member of the New South Wales Field Naturalists' Club, and one who had done good work in the botanical world.

The president, on behalf of the Club, extended Miss Sulman a hearty welcome to the meeting.

REMARKS ON EXHIBITS.

Mr. J. Searle called attention to a rather uncommon freshwater crab, *Hymenosoma lacustris*, taken by Mr. F. Dawson, a new member of the Club, who made his first acquaintance with "pond-hunting" at the Club excursion to Alphington in September last. The specimens were taken in a pond at Glenferrie

towards the end of September, and, though diligent search had since been made, no further specimens had been found. He stated that the species had been recorded from Lake Puperta, N.Z., and Norfolk Island, and, as regards Victoria, he had found it in Lake Colac. Mr. J. A. Kershaw had obtained two specimens at Wilson's Promontory, while Dr. Hall informed him that it had been recorded from the Moorabool River.

Mr. F. Pitcher, referring to his exhibit of *Marchantia polymorpha*, in fruit, collected during the excursion to Yering Gorge on Cup Day, 3rd November, said the specimen was taken from a luxuriant patch, about a square yard in extent, which formed a striking contrast in colour to that of the surrounding vegetation.

Dr. C. S. Sutton directed attention to an abnormal growth in a spike of Foxglove, *Digitalis purpurea*, L., the arrangement of the flowers in the upper part of which showed some evidence of fasciation. The plant from which the spike was culled was collected at Ben Cairn some years ago, and, though it has been under cultivation since then, has reproduced, each season, the characteristic feature that had first claimed his attention.

PAPER READ.

By Mr. J. A. Kershaw, F.E.S., entitled "A Naturalist in Northern Queensland."

The author gave an interesting account of a collecting trip in the tropical scrubs north of Cooktown, and of a visit to the Great Barrier Reef. The paper was illustrated by a fine series of lantern slides.

LIST OF EXHIBITS.

By Mr. F. G. A. Barnard.—Pot-grown specimen, *Drimys aromatica*, F. v. M., Native Pepper-tree, grown by the exhibitor.

By Mr. F. Chapman, A.L.S.—Ostracoda from the Yarra flats near Yering, collected on the Club's excursion to Yering Gorge, 3rd November.

By Messrs. J. H. Gatliff and J. Stickland.—Specimen of *Pteris incisa*, Batswing Fern, 7 feet 6 inches in height, from Crowley's Creek, Healesville.

By Mr. F. Pitcher.—*Marchantia polymorpha*, collected on Yering Gorge excursion.

By Dr. C. S. Sutton.—Flowering spike of *Digitalis purpurea*, showing evidence of fasciation in the upper portion.

By Mr. A. L. Scott.—Blood of the Black Snake, *Pseudechis porphyriaceus*, under microscope.

By Mr. J. Searle.—A freshwater crab, *Hymenosoma lacustris*, and specimens of the handsome ostracod, *Cypris mytiloides*, obtained on the Yering Gorge excursion.

After the usual conversazione the meeting terminated.

EXCURSION TO PAKENHAM.

THE excursion to Pakenham on Saturday, 17th October, was well attended, fifteen members and friends, including several ladies, meeting the leaders at Pakenham (35 miles) on the arrival of the morning train. The morning was fine and cool, and the drive northwards was very enjoyable. At the Deep Creek, about three miles from the station, Mrs. Wisewould and the Misses Keble and Major provided bush tea before starting on the walk over the hills. During the walk a number of interesting flowering plants were met with, and Mr. F. Pitcher has kindly made a list of those found in flower, which contains the names of about 70 species. Doubtless in an ordinary season the list would have been much longer, but the exceedingly dry spring had greatly reduced the flowering period of a number of species. He mentions as the most noteworthy *Olearia (Aster) stellulata*, var. *lirata*, *Spiridium parvifolium*, *Pultenaea scabra*, *P. Gunnii*, *Daviesia latifolia*, *Dillwynia floribunda*, and *Dampiera stricta*. The orchids, *Pterostylis nutans*, *Prasophyllum patens*, *Thelymitra longifolia*, *Caladenia carneae*, and *C. Patersonii*, were also collected. Some seven or eight of the commoner ferns were also seen. The summit of the hills to the east of Upper Pakenham was reached about 2 p.m., when the grand panorama spread out before the party greatly surprised those who had not been in the district before. A halt was here made for lunch, after which one of the leaders gave some account of the geology and physiography of the neighbourhood. Kelly's Hill, as our vantage spot is locally known, is situated in allotment 77, parish of Nar Nar Goon, and may be regarded as the most southern part of the central highlands of Victoria. It is about 790 feet above sea-level, and owes its prominence to a capping of basalt which has filled an old stream valley, now, through the cutting back of flanking streams in the softer Silurian shales and mudstones, many hundreds of feet above them. Looking from the hill across the south-western and south-eastern quadrants, several outstanding physiographical features present themselves. Cappings of basalt on conspicuous elevations at Beaconsfield, Mount Ararat, near the Tarago, and elsewhere preserve the remnants of an old system that drained an area much more extensive than that served by the streams now falling into the same basin. There can be little doubt, from the contours of the area, that this drainage system found an outlet through the western channel of Western Port Bay. That the catchment included what is now part of the floor of Port Phillip Bay is evident from the truncated ridges terminating in Mounts Eliza and Martha and Arthur's Seat, here seen from the east. It is not difficult to picture the great early Tertiary valley

that extended as far as the eye can see to the south, to the east where it is now flanked by the Jurassic highlands, and to the west beyond the granodiorite hills on the east side of Port Phillip Bay. The north-west quadrant terminates with the Mount Dandenong dacite area, and the north-east with Mounts Arnold, Donna Buang, and Lookout, over 40 miles away. The Beenak Gap is represented by a great notch in the otherwise fairly regular skyline. The near distance is characterized by basalt-capped hills, under which occur similar high-level river gravels to that at Kelly's Hill. A good example of the resistance to erosion by the altered sediments along the Silurian-granodiorite contact was pointed out, as well as the soil derived and transported from the several geological formations and their incidental flora. Later in the day, Prof. D. Hutchens, late Professor of Forestry at the Cape Town (South Africa) College of Forestry, became an interested member of the party. Several wishing to catch the early train to town, there was not time to visit the heathy country further east, where a large variety of native flowers may usually be found.—F. WISEWOULD, R. A. KEBLE.

MAGPIE, &c.—During a recent visit to Bacchus Marsh I observed a young White-backed Magpie perched on one of the topmost limbs of a fallen grey box. The view from the bird's station was an extensive one, and no doubt Mag would have found it interesting but for the persistent attacks of a pair of Sordid Wood-Swallows and a pair of Black-and-White Fantails. The former contented themselves by diving from the branches of the adjacent trees at the object of their wrath, whose equilibrium on the limb they repeatedly upset. The fantails, on the other hand, perched in turn on the back of the magpie, and by the vigorous use of bill and wings endeavoured to induce it to take flight. Mag, with a "Here I am and here I stop" sort of demeanour, took the buffeting in good part, till my near approach necessitated a compulsory retirement from the scene of hostilities. During its protracted flight the magpie was vigorously assailed by one fantail and by the pair of wood-swallows. Whilst the encounter on the limb was in progress a pair of Blue Wrens were perched within a few feet of the magpie, but did not attempt to molest it. On the same day I noted a Yellow-tipped Pardalote enter the nest of a Fairy Martin that had been constructed beneath a flume on the irrigation channel. The bird did not stay long in the nest, and on issuing perched on the wire of an adjacent fence. Lack of time prevented me from keeping the bird under observation in order to determine the object of its visit.—J. G. O'DONOGHUE.

A NATURALIST IN NORTHERN QUEENSLAND.

By J. A. KERSHAW, F.E.S., Curator of the National Museum,
Melbourne.

(*Read before the Field Naturalists' Club of Victoria, 9th Nov., 1914.*)

IN October of last year Dr. W. Macgillivray, of Broken Hill, and his son Ian proposed to undertake an extended collecting trip to the Claudie River district, in the northern portion of Cape York Peninsula, North Queensland, and kindly invited me to join them. This, with the consent of the Trustees of the Museum, I was only too pleased to do.

It was arranged that we should proceed by rail to Brisbane, thence by boat as far north as the Claremont Island lightship, situated about midway between Cape Melville and Cape Grenville. Here we would transfer into a lugger owned by a *beche-de-mer* trader (Mr. H. Giblett) and go on to Lloyd Island, in the bay of that name just north of Cape Direction and close to the mainland. At Lloyd Island we expected to meet our friend Mr. W.M'Lennan, an enthusiastic ornithologist, and would then leave for the Claudie River, which empties itself into Lloyd Bay some miles to the south of the island.

Leaving Melbourne on the evening of the 24th October, we travelled direct to Brisbane, which we reached late in the evening of the 26th. The next three days were busily occupied in purchasing and packing the greater part of the collecting material, stores, &c., required for our lengthened visit, and on the evening of the 29th we left Brisbane on our journey north.

We were favoured with exceptionally fine weather and a perfectly calm sea, and, although the heat gradually became more and more intense, it did not in any way interfere with the enjoyment of the trip. On the second day we found ourselves inside the southern end of the Great Barrier Reef, and from now on were continually passing the numerous islands, large and small, scattered over the sea between the Barrier and the mainland. Many are high and rugged, rising steeply from the water, others rounded and covered with vegetation, or mere sand-banks. Very few birds were noticed about the islands, but several butterflies were seen flying past the ship. In places the surface of the sea was covered for many miles with a greenish, slimy-looking substance, which gave the water an oily appearance. Numbers of porpoises were seen, while the sea was teeming with enormous shoals of large silvery fishes said to be "Kingfish." On either side of the boat these could be seen swimming close to the surface, and frequently springing high out of the water as they were pursued by the porpoises, while at a distance the shoals were indicated by the broken surface of the smooth sea. Occasion-

ally a great black mass was seen on the water, which proved to be a Killer Whale, or "Black-fish," *Orca gladiator*, one of the large-toothed whales, which frequently attains a length of over 30 feet.

About 5 o'clock on the 31st we passed through Whitsunday Passage, which is regarded as one of the most picturesque portions of the scenery along the coast. The numerous thickly-timbered islands make a beautiful picture in the soft evening light. Between this group of islands and the Barrier Reef is a labyrinth of coral reefs and shoals, covered at high water, but showing an endless variety of marine life when exposed. Pentecost or Lion Island, so called from its remarkable resemblance to a crouching lion with its head raised, is one of the chief features here. On Dent Island is erected a lighthouse, prettily situated, and surrounded by a number of large cocoanut palms.

Townsville was reached early in the morning of the 1st November, and, having some hours available, we visited the Botanic Gardens, this being thought the nearest available collecting-ground. Here we spent some time collecting several species of butterflies, among which were *Hypolimnas (Diadema) nerina*, *Papilio ægeus*, *P. sarpedon*, *Danaida affinis*, *Callidryas pomona*, *Euplaxa sylvester*, *Eurycus cressida*, and the skippers *Telicota kreffti* and *Padraona sunias*. The gardens contained several very fine mango trees, among the branches of which many birds sheltered. These included Blue Mountain and Scaly-breasted Parrots, Orioles, Fig-birds, Dollar-birds, Drongos, Mud-Larks, and the Yellow-spotted Honey-eater, *Ptilotis notata*. Flying Foxes were said to be very destructive to the mangoes, quantities of the fruit strewn under the trees showing the result of their visit of the previous night. Before leaving Townsville we visited the Tropical Diseases Institute, and were courteously shown over the building by Dr. Brelil.

We left Townsville about 4 o'clock, and three hours later passed the Palm Islands, a group of some half-dozen granite islets, from 10 to 20 miles off the mainland. These are fringed with beautiful coral reefs, exposed at low tide. On the way several Great Crested Terns and a number of Lesser Crested Terns were seen, the latter repeatedly diving into the sea among the shoals of fishes.

Our first sight of the Torres Strait or Nutmeg Pigeons, *Myristicivora spilorrhoa*, was obtained when near Low Woody Island early the following morning. These were flying towards the mainland from the island, where they camp, and probably nest. Brown-winged Terns, *Sterna anæsthetia*, were frequently noticed diving into shoals of fish. Skimming along the surface of the water was seen a fish locally known as the "Skipper."

It is long and narrow, apparently about 15 to 18 inches in length, and has a habit of swiftly skimming along the surface for a distance of about 20 or 30 yards in an almost vertical position, only its tail touching the water. I saw several of these fish acting in a similar manner during my trip, but was unable to obtain one for closer examination.

All the morning we were passing close to the mainland, which is here margined with high, rugged, thickly-timbered hills, rising steeply from the water's edge, with here and there a short, narrow, sandy beach. A good view of Mount Peter Botte was obtained, and shortly after we reached Cooktown, our last touch with civilization for some time. The few hours at our disposal were spent in some open forest about a mile from the town, where we obtained a number of butterflies, among them being the large *Troides pronomus*, *Danaida affinis*, *D. archippus*, *Melanitis bankia*, *Junonia albicincta*, *Euploea sylvester*, *Hypolimnas (Diadema) nerina*, *Papilio aegeus*, &c. *Callidryas pomona* were flying commonly about the streets. Cicadas were very numerous, and filled the air with their shrill song. There seemed to be but one species—*Macrotristria intersecta*. Insects generally, however, were scarce, and, beyond the butterflies mentioned, little else was seen, probably owing to the exceedingly dry state of the country. The shore of the harbour is margined with mangrove, among the roots of which the fish known as the "Mud Skipper," *Periophthalmus*, could be seen skipping rapidly over the muddy surface. Among birds we saw several Whistling-Eagles, Yellow Orioles, *O. flavicinctus*, Fig-birds, *Sphecotheres flavigularis*, Quoy's Butcher-bird, *Cracticus quoyi*, Friar-bird, *Philemon sordidus*, Yellow-spotted Honey-eater, *Ptilotis notata*, Bichenov's Finch, Sun-birds, and Leach's Kingfisher, *Dacelo leachi*. One of the latter was seen to enter the spout of a gum-tree from which Dr. Macgillivray obtained two eggs on a previous visit.

Our boat was timed to leave at 8 o'clock the same evening, but, owing to the tide failing to rise sufficiently high, we were compelled to remain until nearly 10 o'clock the following morning. From Cape Bedford, immediately north of Cooktown, there is a long stretch of rather low, barren, sand-hill country, more or less covered with low scrub, behind which, in the far distance, is a range of high hills. The sand-hills along the shore are deeply furrowed and cut into by wind action, and in places seem to rise abruptly from the shore. This long stretch of barren country suggests a natural barrier to the fauna inhabiting the dense forest and scrubs to the north and south. Proceeding north, still within the Barrier, numbers of small, low-lying islands were passed, around which, at low

tide, extensive coral reefs are exposed to view, and it was here that Saville Kent obtained many beautiful examples of corals, together with some excellent photographs. Passing the bold headland of Cape Flattery, Lizard Island (where, many years ago, Mrs. Watson was attacked by the blacks, and, after much suffering and privation, perished with her child) stood out clearly on our right. Here Captain Cook landed and discovered the passage through the Barrier Reef known as Cook's Passage. A little further north were seen the Howick Group, situated about 20 miles south of Cape Melville, beyond which the line of the great reef could be seen. Numbers of birds were flying about these islands, chiefly Noddies, *Anous stolidus*, Lesser-crested Terns, *Sterna media*, and Brown-winged Terns, *Sterna anæsthetla*, which were repeatedly diving among the shoals of fish. Darkness came on before we reached the Pigeon Island lighthouse, a mile or so off Cape Melville, and, crossing Bathurst Bay, we passed close to the Flinders Group, high rocky islands clothed with tall trees, palms, and shrubs. Crossing Princess Charlotte Bay, our course was directed for the Claremont lightship, stationed among the group of small islands of that name, rather less than 10 miles off the mainland, and about half-way between Cape Melville and Cape Grenville.

We reached the lightship about 1 o'clock a.m., and were pleased and also relieved to find our lugger, the *Keats*, awaiting us, with Mr. Giblett in charge. The stores for the lightship were soon transferred, after which our own more bulky belongings were stored away in the lugger. Bidding good-bye to the captain and pilot and a few friends who had turned out to see us off, we left the *Suva* at 2 o'clock a.m. and started on our twenty-four hours' sail to Lloyd Island, some 80 miles north, and about midway between Cape Direction and Cape Weymouth. We soon found a great difference between steaming along in a large steamer with a roomy deck cabin and comfortable surroundings and sailing in a 30-ton *beche-de-mer* lugger. Here we were restricted to a portion of the narrow deck where we slept, ate our meals, and passed our time generally. There was certainly a small cabin below the deck, but we infinitely preferred the scorching sun by day and the hard boards of the deck by night to the smell of stale smoked *beche-de-mer*, burning mangrove logs, niggers, cockroaches, &c. We stretched ourselves on the hatchway and managed to secure a couple of hours' sleep before the sun became too hot. Our crew consisted of half a dozen blacks, quiet and retiring but very willing fellows, who thoroughly understood the management of the boat. One of these, a rather good-looking boy named "Cocoanut," boiled our billy and prepared our

rough and ready meals. Following along the coast until mid-day, we anchored off the shore for the purpose of landing some stores on the beach for some blacks employed by Giblett to gather sandalwood in the back country. We spent an hour or so on the broad sandy beach, but, beyond numbers of the small, coiled, chambered shells of the well-known cephalopod, *Spirula peronii*, and some broken nautilus shells, there was little of interest to be found. The country was flat and marshy, and covered with dense mangroves, among the branches of which were suspended dozens of nests, large and small, of the green ant, *Ecophylla smaragdina*. The ants themselves were everywhere—on leaves and trunks, logs, and on the ground. One could not rest in peace, and more than once we had to hurriedly discard portions of our clothing to rid ourselves of them. Among the mangroves we saw Leach's King-fisher, the Sun-bird, and a Robin which we could not identify. In some shallow brackish water among the trees were numbers of fish, including very large examples of the Barramundi, while the small mud-skipper, *Periophthalmus*, were darting about among the mangrove roots. Here, also, I saw our first specimens of the beautiful mangrove blue butterfly, *Arhopala amyntis*, but, as our collecting material was packed away on the boat, we had to content ourselves with admiring them at a distance. The day was intensely hot, especially so in the mangrove swamp, and we were glad when we resumed our voyage. As evening came on hundreds of the White Torres Strait Pigeons were seen flying from the mainland in small groups towards the various small islands, where they camp and breed.

Lloyd Island was reached a little after midnight, where we were welcomed by Mr. W. M'Lennan, who had come across from the mainland to meet us, and it was not long before we were enjoying a few hours' sleep on the open beach. Soon after daylight we started off to explore the island. Lloyd Island is about a mile long and half a mile wide, situated about a mile from the mainland, from which it is separated by very shallow water. The sheltered side is bordered with a thick, dense belt of mangrove, *Rhizophora mucronata*, growing luxuriantly in the shallow water, behind which the island rises steeply to a height of 200 feet. Parts of the hills are well timbered, the remainder being bare, but fairly well grassed. On the exposed ocean sides the shores are very rocky and broken, the only small sandy beach on the eastern side being thickly strewn with pumice, broken shells, and coral. Like several of the other islands visited later, the rocks along the shore are thickly covered with very fine oysters, *Ostrea nigro-marginata*, to which we did ample justice. About the centre

of the island, opposite the mainland, is a short beach of pure white sand, on which, in a well-sheltered position, is Mr. Giblett's home. This consists of a two-roomed galvanized building, behind which, at some little distance, are the numerous mia-mias of the blacks employed on the *beche-de-mer* boats. These mia-mias are the usual low, dome-shaped structures, consisting of a framework of long twigs stuck into the ground, the tops bent over and tied together, and the whole covered with broad sheets of paper-bark. Many, however, consist simply of a rough lean-to, with two or three sheets of paper-bark, in the shelter of which lounge the gins and their piccanninny.

The mangrove forms the roosting-place of countless numbers of the Nutmeg or Torres Strait Pigeons, Blue Mountain Parrots, and the Shining Starling, which depart for their feeding grounds on the mainland in the early dawn, returning again late in the evening to roost. The cooing of the pigeons is heard on every side, making a continuous and very monotonous murmur, which continues all day long and far into the night. As the birds arrive in the evening or depart in the early morning in an incessant stream, this noise is increased until the whole air is filled with it, and when combined with the shrill screeching of the myriads of Blue Mountain Parrots and the loud and sharp chirps of the Starlings which pour into the mangrove in incredible swarms, it is indescribable. Dr. Macgillivray's description is worth quoting. He says:—"This large stream of screeching and cooing creatures continues to pour into the mangrove patch until it can hold no more, and the noise is almost deafening. The overflow occupies the trees on the side of the island, until not every tree, but every limb, has its quota of either pigeons or lorikeets, the pigeons making the dark mass of the mangroves to appear as if covered with great white blossoms. The lorikeets take longer to settle, rising again and again in vast flocks, whirling and screeching over the trees: but when they are all settled their voices are the first to quieten, the cooing of the pigeons lasting about an hour longer. Then, with darkness, all is quiet till the moon rises, when a few pigeons can be heard until dawn. . . . At earliest dawn, when the mangrove belt is still a dark mass, the lorikeets bestir themselves and begin their screeching again. With a very little more light they are all astir, and, rising in a dense, wheeling, whirling, and screaming host, soon head off to the mainland. As the last lorikeets are leaving, the advance guard of the pigeons begins to move off in small flocks—threes, pairs, or singly at first, and then in larger numbers." The pigeons nest here in the mangrove, their shallow nests of small sticks and twigs, containing a single

white egg, occupying almost every tree. Later on, when the young are able to fly, they leave for the far north, but during their long stay a great many are shot for food, without any apparent diminution in their numbers. Among other birds noticed during this visit were the Varied Honey-eater, *Ptilotis versicolor*, which were plentiful among the mangrove, where they breed, the Mangrove Kingfisher, Barred-shouldered Dove, White-rumped Wood-Swallow, and Sun-birds, the latter being observed gathering kapok, the seed-pods of which were scattered about, with which to line their nests. A Black-cheeked Falcon was seen flying overhead, while on the beach were seen the Little Mangrove Bittern, *Butorides stagnatilis*, and the Reef Heron, *Demigretta sacra*.

Getting our stores and baggage together, we left the island during the morning in a small cutter manned by a couple of natives, and steered for the Claudie River, some distance down the coast. This is a fair-sized stream, about three chains wide at its mouth, and is affected by the tide for some 10 miles inland. Our permanent camp was situated about 8 miles from the entrance, and, as the tide was flowing in, we were able to sail up stream for some 5 or 6 miles, after which we landed and walked the last few miles, leaving the natives to bring up our most necessary baggage in the dingey.

For the first two or three miles the view from the river is rather monotonous, the muddy banks being chiefly lined with two or three species of mangrove, the fruit of one of which somewhat resembles an enormous orange. The country here is flat and swampy, and subject to inundation at high water. Further on, however, the river scenery becomes more and more beautiful, the banks being lined in places with great palms growing in the mud at the water's edge, their enormous fronds, growing from a small root, being from 40 to 50 feet long. Another smaller palm, with a long, slender trunk, resembled the Cabbage-tree Palm. Great, spreading, large-leaved trees drooped over the banks until their branches dipped into the water, while creepers and vines of various kinds hung in great festoons from the tree-tops. Suspended from the shrubs overhanging the water were seen many of the ragged, bulky nests of *Gerygone lavigaster*, about a couple of feet long, resembling flood débris. The nest proper is towards the bottom, and the small entrance at the side. A solitary Jabiru was seen soaring gracefully overhead, its long legs stretched out behind and its white flight-feathers showing conspicuously. A White-headed Fish-Eagle, *Haliastur indus*, was noticed perched on a high tree near by, while several Yellow-legged Spoonbills, Kingfishers, Sulphur-crested Cockatoos, and Rifle-birds were either seen or heard. We reached our

camp just before dark, where we found Mr. Alf. Mohr, a friend of Mr. M'Lennan's, expecting us, and, as we had fasted since early morning, we were soon enjoying a hearty meal.

The next morning, the remainder of our baggage having been brought up the river from the cutter, we soon had our additional tents erected, and everything put in order for our lengthened stay. We had now an opportunity to examine our surroundings. Our camp was pitched on a low hill adjacent to and overlooking the river. The surrounding country consisted of open forest, with numerous small hills, extensive open, grassy flats, and great tea-tree swamps. Bordering the river and the numerous gullies and streams running into it are extensive tropical scrubs, extending for many miles in all directions. These consist of dense masses of vegetation and enormous trees, so intermixed with lawyer and other vines and creepers as to make it very difficult to travel through them. The open flats are covered with a thick growth of coarse grass, often up to four feet high, among which are scattered groups of Screw Palms, *Pandanus*, and in many places termites' mounds. Our camp consisted of a large tent, 10 feet by 14 feet, two smaller ones (one of which was used for storing some of our collecting material), and a large roomy fly, raised well off the ground and open at either end, in which our mosquito-proof camp beds were placed. Close by was erected a good-sized dining and cooking place, which consisted simply of a roof of saplings thickly covered with great palm leaves gathered on the river, with fixed table and seats, making a cool and very comfortable shelter. Here we had our meals, and at the end of each day's work wrote up our notes and sorted and attended to our specimens, surrounded with several smoke fires to keep off the mosquitos. As the river was subject to tidal influence for some distance above our camp, it was necessary to obtain our fresh water about two miles further up stream. We had as a camp pet a very young Cassowary, nicknamed "Casey," which Mr. M'Lennan found just recently hatched from the egg, and which was reared for some time on bread, meat, and native fruits. It became exceeding tame and playful, and we often had much difficulty in preventing it from following us on our excursions. After rearing it for five or six weeks, however, it was, much to our sorrow, accidentally killed.

The practical work of our trip now began. Mr. Mohr, who had accompanied Mr. M'Lennan from the north with the object of prospecting the country, undertook the management of the camp, so that we were able to devote the whole of our time to collecting and exploring the country and attending to our specimens. Every hour of the day was fully occupied. We

rose at dawn and went to the river for a bathe, had breakfast, then away exploring the scrubs on either side of the river, or the more open forest. As often as not we did not return until dusk, and, after another bathe, donned our pyjamas, had tea, and settled down to attend to our specimens and write up our notes, which, as a rule, kept us occupied until about midnight. The river was infested with crocodiles, rendering it dangerous to enter the water, though on more than one occasion we were compelled to take the risk. Their tracks were frequently seen along the banks, and their loud barking cries often heard at night.

Numbers of birds frequented the vicinity of our camp, many of which I now saw for the first time in their wild state. Among these were Friar-birds, Orioles, Leach's Kingfisher, Drongo Shrikes, Quoy's Butcher-bird, several species of Honey-eaters, and the Striated Pardalote. The Great Palm Cockatoo, which nests in the hollows of the larger trees of the open forest, and the Sulphur-crested Cockatoo were generally about the river, while every morning great flocks of the Torres Strait or Nutmeg Pigeons, Blue Mountain Parrots, and Glossy Starlings arrived from the islands, and departed again in the evening. The Pheasant Coucal, one of the largest of our cuckoos, and the only Australian cuckoo which builds its own nest and rears its young, could be seen and heard every day, while in a large eucalypt close by our camp a Podargus, *P. marmoratus*, had its nest and young. Flying foxes, *Pteropus* sp., could be heard squealing at night, or flying low down over our tents. Along the margin of the scrub, and in the adjacent open country, insects of various kinds were obtained. Until the rainy season started, however, these were not plentiful, but after the first rains had set in they became more numerous, although insects generally were not nearly so plentiful as I expected to find them. The commonest of the butterflies taken here were *Terias sulphurata*, *Yphthima arctous*, *Mycalesis sirius*, *Hypocysta adiante*, and *Papilio fuscus capaneus*. The great bird-winged butterfly, *Troides pronomus*, the female of which measures up to 7 inches across the wings, was often seen on the edge of the scrub, but usually flew high about the tops of the trees. The most gorgeously coloured of all, however, was the brilliantly blue *Papilio joesa*, the first specimens seen creating great excitement as they flew along the river just over our heads. These seem to prefer the open space along the river to the more open country.

My first visits into the dense scrubs will be long remembered. Forcing our way through the tangled undergrowth skirting the edge, we pass out of the fierce, hot glare of the sun into the cool and rather gloomy recesses of the scrub. The closely-

growing trees tower up above us, and, with the various creepers and vines, form a canopy through which the sun only penetrates here and there. The rather uncanny stillness is intensified by the thick carpeting of leaves and decaying vegetation which silences our footsteps, and is only broken by the occasional calls of the birds overhead, or the monotonous, shrill song of the cicada. Broad gutters, which drain the scrub in the wet season, but are now dry and covered with decaying leaves, &c., wind about through the trees, eventually finding their way to the river. Great lawyer vines, armed with their strong, curved thorns, hang in wonderful festoons from the trees, and, with various other vines, continually bar our way. One of our greatest troubles for the first few days, however, was the green ants. These creatures are to be found on almost every tree, shrub, palm, log, or piece of grass, as well as on the ground, both in and out of the scrub. Their nests are formed of leaves, the edges of which are drawn together and fastened with silk, and one has only to brush against one of these to be immediately covered with dozens of the ants. Time after time we had to hurriedly drop everything and strip off our coats and hats and help one another to get rid of them. Their bite, however, is not severe, and does not last long, so that after a time we did not worry about them. Experience also taught us to keep a keen look-out for these and other pests, and so evade them to some extent. A small black ant, which forms its nests on the leaves of a palm, was much more annoying, as, although not so numerous, its sting was very severe and lasting. Another insect to be avoided is a small wasp, *Polistes* sp., which attaches its small papery comb to the under side of the palm fronds, or a small branch, always low enough for one to brush against.

The Scrub-Fowl, *Megapodius tumulus*, is common here, and their enormous conical mounds of earth, leaves, and sticks are frequently met with. One of the largest of these was fully 15 feet high and 25 to 30 feet in diameter at the base. The Brush-Turkey, *Talegallus purpureicollis*, also frequents the scrubs. Its nesting-mound is, however, much smaller than that of the Scrub-Fowl. The beautiful Rifle-bird, *Ptiloris alberti*, was frequently seen flying rapidly through the scrub, and its loud call could be readily distinguished. Several nests were found, some of which contained two beautifully-streaked eggs. The nest is an open, loosely-built structure, composed of the broad leaves of a tree common to these scrubs, and lined with long, slender leaf midribs. They were found in slender shrubs or among the lawyer vines, usually from 8 to 10 feet from the ground. One of the most interesting birds was the large Red-sided Parrot, *Eclectus*

pectoralis macgillivrayi, a new sub-species, only recently recorded from Australia by Dr. Macgillivray. It seems to be very local, as, although fairly plentiful here, it has not been found elsewhere on the mainland. It nests in a hole in the limb of a very large fig-tree, frequently in company with the Sulphur-crested Cockatoo, Grey Goshawk, and colonies of Glossy Starlings. To reach the nests it was necessary to use a long rope-ladder, as the lowest limb was usually from 60 to 70 feet from the ground, and the nest considerably higher. Mr. M'Lennan undertook the rather dangerous work of climbing these trees, frequently adopting the method followed by some of the blacks of chopping steps in the smooth trunk about three feet apart, and only sufficiently large to provide a hold for his big toe. Several nests were investigated in this way. The Glossy Starlings are gregarious, breeding in large companies, their large, bulky nests of tendrils and fine fibres hanging close together from the ends of the boughs. These birds are exceedingly noisy, and their cries when disturbed almost deafening, so that one can always tell when approaching their nesting-places. Under their nesting-trees the ground is usually littered with seeds of various kinds. The Grey Goshawk is said to select a tree for its nest occupied by the Starlings, so that it has a ready supply of young chicks for its young. The small, frail, cup-shaped nest of the Frill-necked Flycatcher, *Arses lorealis*, was found attached to long, thin vines suspended from a high tree. It was composed of fine fibres and rootlets, ornamented with pieces of lichen and spiders' web, and contained two eggs. The bird remained on her nest, which was about 20 feet from the ground, until it was almost touched. Other rare nests found in the scrub were those of the White-faced Robin, *Pæciliodryas albifascies*, built in a small sapling about five feet from the ground, and composed of leaves with pieces of bark attached to the outside, lined with fine fibres, and contained two eggs; the Scrub-Robin, *Drymodes brunneopygius*, a cup-shaped, compactly built nest lined with fine fibres, the base formed of small sticks, containing two eggs; and the White-browed Robin, *Pæciliodryas superciliosa*, a frail, shallow structure of small twigs and rootlets suspended in some leafless creepers about five feet from the ground, and containing two eggs. Among the trees, and especially in any small open space, flitted butterflies of several kinds. The most common was the small black and white *Tellervo zoilus*, *Melanitis bankia*, and *Doleschallia australis*, the two latter of which closely resemble the dead leaves on the ground, among which they always settle. Two new species, *Hypocysta angustata* and *Pepliphorus claudia*, were found here, as well as several examples of *Delias aestiva* and the rare *Terias virgo*, but probably the

most exciting capture was the beautiful orange butterfly, *Delias inferna*, not previously found south of Cape York. Beetles were scarce, although no opportunity was lost of searching under the rapidly-decaying logs and other likely places. Several species of large land-shells were, however, obtained, especially after the rainy season commenced, while along the banks of the shallow water-courses were often seen heaps of a large bivalve, indicating a recent feast by the blacks. Collecting in the scrub had to be relinquished in time to reach camp at sunset, as it was impossible to travel in such country after dark.

(*To be continued.*)

OSTRACODA. — Several interesting species of Ostracoda, collected near Yering, were exhibited by Mr. J. Searle at the November meeting of the Club. These little bivalved crustacea are very interesting to the student of minute animal life. Their distribution in Victoria is as yet only slightly known, and when this group is fully worked out it will show that we possess a very rich ostracodal fauna. At present we owe our knowledge of the Victorian species of ostracoda to the work of the Rev. R. L. King, Dr. G. S. Brady, and Dr. G. O. Sars. These workers, however, examined material which came from other parts of Australia. The commonest form represented in the present gathering is *Cypris mytiloides*, G. S. Brady, a widely distributed species, and also a very variable one. It differs from other known species of the genus in its peculiar caudate extremity, in which it seems to resemble *Macrocypris*. Dr. G. S. Brady, however, is convinced of its relationship to the genus *Cypris*, as seen in the structure of the animal. Another common species found in this sample is the cheerful little *Cypridopsis minna*, King, sp., which, in its rather vivid green carapace with lighter bands of variegation, is seen spinning and paddling at a great rate through the water. A larger species of ostracod is also present in some numbers, probably allied to *Cypridopsis*, and apparently new, but may, perhaps, be eventually identified with King's "*Cypris*" *carinata*, although his figures and description, being not too satisfactory, will render the comparison rather difficult. A fourth species occurring here is a form of *Notodromas*. It agrees somewhat closely with Brady's *N. fuscatus*, from the Tweed River, New South Wales. *N. fuscatus* is of a brownish colour, whilst ours is green, but what is a more important difference is that the carapace in our form is more angulate, seen from the side, than in *N. fuscatus*. In the latter respect it shows some affinity with *N. fenestratus*, of King.—F. CHAPMAN.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday, 14th December, 1914.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 30 members were present, the night being very wet.

REPORTS.

A report of the Belgrave-Narre Warren excursion on Saturday, 21st November, was made by the leader, Mr. F. G. A. Barnard, who stated that eight members and visitors attended. The main object of the excursion was to visit a large granite rocking stone, situated about midway between Belgrave and Narre Warren. The stone, which was estimated to weigh about eight tons, could be rocked with very slight exertion. Measurements and photographs of this unique natural object were taken. A special feature of the trip was the abundance of the Pale Wedge-Pea, *Gompholobium Huegelii*, Benth., in bloom along the route.

A report of the excursion to Beaumaris, on Saturday, 12th December, was made by Mr. J. Stickland, who intimated that, owing to the dry season, no ponds were available for the members of the party, twelve in number. The seaside was accordingly sought, where the party divided, some electing to confine their investigations to the shore-line, whilst others ventured on the water.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. E. W. Mylrea, 141 Cotham-road, Kew, and Mr. C. L. Plumridge, Brougham-street, Kew, were duly elected as ordinary members of the Club.

GENERAL BUSINESS.

Mr. O. Rosenhain said that, in company with Mr. A. W. Milligan and Mr. J. G. O'Donoghue, he had visited Mourn Pool in September last. The lake was one of several large areas of water situated on the flood plain of the Murray, about eight miles north of Hattah, on the Mildura line, and was the resort of numerous species of native birds and animals. The Acting Chief Inspector of Fisheries and Game, Mr. F. Lewis, proposed to have this lake, and the neighbouring lakes and "billabongs," proclaimed as a sanctuary for native game. As he apprehended a deal of

opposition, the Club, by advocating the reservation, would materially strengthen his case. He would therefore move—"That the Fisheries and Game Department be written to and asked to proclaim that part of the country a sanctuary for native game."

In seconding the resolution, Mr. O'Donoghue said the Chief Inspector of Fisheries and Game was aware of, and had repeatedly tried to prevent, punt-gun shooting on Mourn Pool. He had been informed that, after a single discharge of the gun used by one individual, as many as 72 pairs of ducks had been picked up. Some idea of the number of water-fowl congregated in the locality might be realized when, in one small area of water, it was estimated that there were at least three thousand black duck and teal, besides other aquatic birds.

The motion, on being put to the meeting, was carried unanimously.

REMARKS ON EXHIBITS.

Mr. G. A. Keartland drew attention to his exhibit of a caged Blood-stained Cockatoo, *Cacatua sanguinea*, Gld., from Broken Hill. When he purchased the bird, which was now 15 years old, it was quite young, and the naked skin round the eyes was white. Since then the skin has changed to a blue colour, which is the chief characteristic feature that differentiates *C. gymnopsis* from *C. sanguinea*. If both species were good ones, to which did the bird exhibited belong?

Dr. T. S. Hall, in referring to his exhibit of a tibia of the Great Red Kangaroo, *Macropus rufus*, said the specimen was $22\frac{3}{4}$ inches long, and that there was a specimen in the National Museum about half an inch shorter. These, he considered, must almost be record lengths. The specimen under notice in all probability came from Western Australia.

Mr. A. L. Scott handed in a note referring to his exhibit of iron and lime concretions, collected during the excursion to Beaumaris on Saturday, 12th December, stating that the formation of these concretions is not altogether understood. In a general way it is known that water percolating through soil and surface rock is practically always a carrier of organic acids. These acids may attack both the iron and lime contents of the rock. Changes in temperature, pressure, and contents of the water act and react on each other. Thus we find minerals being dissolved out in one place only to be carried away for re-deposition in another, usually in a different form. The lime in the shells throughout the Beaumaris cliffs has been, and is still being, dissolved out, only to be re-deposited as nodules, which in turn are washed out

of the cliffs to become shore shingle. The iron distributed throughout the cliffs is by a similar process being dissolved and re-deposited. But in this instance the concretions are characterized by a great diversity of shape.

PAPERS READ.

1. By Mr. G. A. Keartland, entitled "On the Blood-stained Cockatoo, *Cacatua sanguinea*, Gld."

The author said the object of his paper was to protest against the undue multiplication of species by present-day ornithologists on insufficient data and study of the bird dealt with. *Cacatua sanguinea* had been named and described by Gould. In a flock of these birds individuals were to be found having the naked skin round the eye of a white colour and others having it of a blue tint. On this variation alone a new species, *Cacatua gymnopis*, had been founded. The bird he exhibited when young had the skin round the eyes of a white colour, but now, when fifteen years old, the skin, as all could see, was blue. He would like to be informed whether the bird was the Blood-stained or the Bare-eyed Cockatoo. So far as he was concerned, *C. sanguinea* and *C. gymnopis* were one and the same bird.

Mr. A. H. E. Mattingley, C.M.Z.S., said the club was indebted to Mr. Keartland for bringing the matter before the meeting. Mr. Keartland had the widest field knowledge of any ornithologist in Australia, and he was in accord with the opinion he had expressed.

The president said the matter was settled some time ago by Mr. A. J. North, C.M.Z.S., who gave as his opinion that *Cacatua gymnopis* is undoubtedly *Cacatua sanguinea*.

2. By Mr. E. H. Lees, C.E., F.R.A.S., entitled "What is Nardoo?"

In a very interesting paper, the author adduced reasons for concluding that the name "Nardoo," commonly applied to *Marsilea quadrifolia*, L., a plant widely known by repute by reason of its association with the ill-fated explorers, Burke and Wills, is not the name of a plant, but refers to a food made by the Australian aborigines from seeds of several plants.

Mr. G. A. Keartland said that during his exploring trips in North-West Australia he often saw the aborigines cooking many kinds of seeds, but he had never noticed them preparing any seeds of the plant we know as "Nardoo."

In reply to Dr. Hall's inquiry if any swampy ground existed in the neighbourhood of the spots at which he had seen the natives preparing food, Mr. Keartland answered in the affirmative.

Mr. F. G. A. Barnard considered the author's conclusions reasonable, and that the name "Nardoo" was applied by the natives to a food and not to the plant *Marsilea quadrifolia*.

Mr. F. Pitcher said that on the evidence before the meeting he saw no reason to separate the name "Nardoo" from the plant *Marsilea*.

Messrs. Gabriel, French, and Rosenhain also spoke on the subject.

3. By Mr. J. C. Goudie, "Notes on the Coleoptera of North-West Victoria," part vi.

The author dealt with the families Nitidulidæ, Trogositidæ, and Colydidæ, listing seventeen species, mostly small and obscure.

Mr. H. W. Davey said that *Kershawia rugiceps*, Lea, was evidently not confined to the North-West, since he had taken it at Ocean Grove, near Geelong.

4. By Mr. H. W. Davey, F.E.S., "Notes on English and Japanese Newts in Victoria."

The author gave some interesting particulars regarding the egg-laying and early stages of both English and Japanese newts, a group of amphibians which are widely distributed throughout Europe, Northern Asia, and North America, but do not occur in Australia, consequently the details of their life-histories can only be obtained by observation of imported specimens. He gave an instance of the remarkable power they possessed of replacing a lost limb, and exhibited a fine series of living specimens in illustration of his remarks.

The Chairman congratulated the author on the interesting character of his notes.

EXHIBITS.

By Mr. F. Cudmore.—Several species of fossil, *Cypræa*, from Balcombe's Bay, Mornington.

By Mr. F. Chapman, A.L.S.—Specimen of granite from under Rocking Stone, Narre Warren, and photographs of the stone.

By Mr. H. W. Davey, F.E.S.—Eggs of newts, showing method of fastening them in leaves of aquatic plants. Eggs in different stages of development. Larvæ of Japanese newts, *Molge pyrrhogaster*, at various stages of development. Larvæ of English newts, *Molge cristatus*.

By Dr. T. S. Hall.—Tibia of Great Red Kangaroo, *Macropus rufus*, 22 $\frac{3}{4}$ inches long.

By Mr. G. A. Keartland.—Blood-stained Cockatoo and skins, in illustration of his paper.

By Mr. W. Scott.—Flowering specimen of *Isotoma axillaris*, Lindl., grown from seed collected at Heathcote.

By Mr. A. L. Scott.—Iron and lime concretions from Beaumaris.

By Mr. J. Searle.—Semi-parasitic copepod, *Monstrilla*, sp.,

Caligus rufimaculata (fish parasite), *Acartia longiremis*, *Calanus finmarchicus*, *Caprilla*, sp., and other crustaceans, from Beaumaris excursion.

After the usual conversazione the meeting terminated.

EXCURSION TO YERING GORGE.

QUITE a large party of members and friends, numbering thirty, detrained at Yering on Cup Day, Tuesday, 3rd November, for the purpose of visiting Yering Gorge. The morning was bright and warm, but a pleasant breeze from the south, though somewhat faint at times, tempered the heat of the sun. Yering station is situated in the midst of alluvial flats, well cultivated for the purpose of supplying milk to the metropolis. Our objective was about two miles away due west. Rambling thither we passed two or three good specimens of the soft-leaved wattle, *Acacia mollissima*, in full bloom, and noticeable at a distance by the strong perfume diffused. As we approached the river, signs of the dry season were evident, from the fact that some small swamps, seldom seen without some water in them, were quite dry. Reaching a bend of the river, a halt was called for a few minutes, when a number of fine specimens of the orchid *Pterostylis cucullata* were found among tufts of grass and moisture-loving plants, such as *Mazus pumilio*, *Cardamine lacinata*, *Claytonia australasica*, *Ranunculus rivularis*, *Isotoma fluviatilis*, &c. Following down stream a fine grove of *Kunzea peduncularis* just bursting into bloom was met with. Here we decided to lunch, and tea was soon made. The fern *Polypodium punctatum* grew luxuriantly close by; presently a solitary specimen of *Solanum aviculare*, with its handsome purple flowers, was met with; then a thicket of hazel scrub, *Pomaderris apetala*, *P. racemosa*, and *Spyridium parvifolium*, was entered, in which were found a couple of specimens of the Potato Orchid, *Gastrodia sesamoides*, in flower. Here also was a fine patch of the hepatic *Marchantia polymorpha*, and close by some sphagnum moss. Emerging on a dry hillside, where a young copper-head snake was killed, we were now in the Gorge proper, for some notes on the physiography, of which I am indebted to Mr. F. Chapman, A.L.S., who was one of the party. He says:—“The country around the area traversed in our excursion is of very great interest to those who study physiography. It is, moreover, one of the most complex of the districts cut through by the Yarra in its course from the Baw Baws to the sea. Our track lay along the Yarra flats, west of Yering station. The underlying rocks of this area are soft mudstone, similar in character to that found just north of Lilydale, and which is so abundantly fossiliferous. It is also of similar age,

since it lies in practically the same line of strike. In other words, it forms a continuation of the gentle fold-trough of the Lilydale series of Silurian rocks, typical of the upper or Yeringian series. Since the rock in this part of the country is a comparatively soft mudstone, the lateral erosion of the drainage system gave rise to the 'flat-land,' a true paradise for the 'pond-lifer.' Striking the river valley, we met the head of the Gorge, which here is one-sided, or bounded on the north-west by elevated river-cliffs and on the south-east or left bank by the flat-land. Proceeding down the river, the cliffs on the opposite or Christmas Hills side became at times precipitous, and often of great elevation, probably as much as 250 feet above the river. This part of the Yarra has been named the Yering Gorge by Mr. J. T. Jutson, and those interested in the physiography of these parts would do well to consult his description of it in the *Proc. Roy. Society Vict.* (vol. xxiii., n.s., part 2, 1911, p. 484 *et seq.*) A curious feature of the Gorge has been pointed out by Mr. Jutson—namely, the bold turns which it makes, which one would hardly expect if the stream were rejuvenated, or increased in erosive power, by a comparatively sudden uplift. Jutson's explanation of this is that 'the elevation was fast enough to allow continuous vertical erosion, but at the same time slow enough to permit the river to curve extensively.' The course of the Yarra in this part has undoubtedly been determined by a fault or crustal movement in a vertical direction and following the line of strike. Hence we have on the right bank a precipitous cliff of hard sandstone rocks of the Warrandyte series, and on the left bank in some places flats with little swampy gardens of mosses and liverworts, in others a comparatively low river cliff of hard rock, although not so steep as on the opposite side of the river. According to Mr. Jutson, the hard rocks on the right bank of the river appear to belong to an older series, probably of the Melbournian group. This difference of geological horizons on the opposite banks can be easily explained by the evidence of great vertical upthrow of the rocks forming the Yering Gorge. Had there been no uplift at all on the 'down-throw' side of parts of the Gorge bounded by flats and ridges, the district from Yering to Croydon would have become, as pointed out by Jutson, a great lake, until drained through at the lowest point of the basin. In this neighbourhood is the valley of the Brushy Creek, with its tortuous course over the flat-land, and this, together with the fossiliferous and other quarries, would be well worth visiting on a future occasion."

After getting through the hilly country, we rested for a while at a shady spot on the river, and had afternoon tea. A turn was then made southwards towards Lilydale, some six miles

distant, and it had been intended to visit a quarry where fossils are abundant, but it was found that time would not allow the detour. On the way to Lilydale, which was reached about 7 p.m., specimens of *Eucalyptus camphora* were added to the collections of the day. Few insects of any rarity were taken. Several specimens of the white butterfly, *Anaphaeis java* (*Pieris*) *teutonia*, were seen earlier in the day near Yering.—P. R. H. ST. JOHN.

EXCURSION TO BELGRAVE.

PERHAPS owing to an early shower on the morning of Saturday, 21st November, the party was smaller than it might have been ; still, eight members and friends reached Belgrave (26 miles), after a somewhat tedious journey, at about 11.30 a.m. Our way led along the Emerald road for a short distance, then we branched off along a track marked "To Lockwood," which took us past the Dandenong Reservoir, formed by a weir across the Monbulk Creek. A little beyond the reservoir we halted alongside the creek to have lunch, and so lighten our loads. A fire was lighted, and tea, provided by the ladies, soon made. Half an hour or so was pleasantly spent in lunching, exploring the creek banks, and photographing the surroundings ; then we crossed the creek and wound our way up a fairly steep track which leads on to the road to Narre Warren. Along this track it was a delightful surprise to see numbers of flowers of the beautiful yellow Wedge-Pea, *Gompholobium Huegelii*, a flower which is usually seen only as solitary specimens. This hillside earlier in the season must have afforded a pretty sight, for *Epacris impressa* and other spring-flowering plants were abundant. On reaching the main road our way led downhill into the watershed of the Cardinia Creek, and about three miles away we could see the sugarloaf hill we desired to reach. Turning into the Lysterfield road, we had a sharp rise to surmount, then another turn, and we were abreast of our object ; but time had been passing, and the ladies found it would be impossible to visit the rocking stone and get the 4.30 p.m. train at Narre Warren, about five miles away, so they reluctantly left the honours of the day to the gentlemen, and wended their way stationwards. As the gentlemen thought they could both climb the hill and catch the train, they made a dash up the hillside, and, on reaching the rocking stone, which is on the western face of the hill, spent half an hour in measuring and photographing the unique object. Some photographs exhibited to-night will give some idea of its appearance. We found that the foundation or basal stone is about 9 feet high and 6 feet 3 inches in diameter one way by about 4 feet the other. The rocking stone is about 13 feet 3 inches

long by 4 feet 6 inches high at thickest part, and about 3 feet 6 inches from side to side. From these dimensions and the average weight of granite we have computed its weight to be about 8 tons, and it is so evenly balanced that a very slight effort is sufficient to rock it up and down. About 3 inches is the extent of the movement allowed by the shape of the lower stone. The axis of the stone is north-west and south-east, the smaller end pointing to the north-west. An effort was made to get a photograph of the stone when moving, but the photographer used too quick a shutter, so that has still to be obtained. There was little time to look around, so we hurried after the ladies. The leader having, through the help of Mr. B. L. Stanton, who was more familiar with the district than himself, put the rest of the party on the road to the station, said good-bye at North Narre Warren, intending to spend another day in the district and visit the leaf beds at Wilson's quarry at Berwick. But fate determined otherwise. Calling to see Mr. G. W. Robinson, a former member of the Club, Mr. Stanton and myself were persuaded to spend the evening with him and talk over old times, &c. In the morning we determined to make back for the hills round the southern edge of the Cardinia basin to Emerald, from whence we took the old road along the summit of the Divide to Belgrave again. The natural history of the trip was not striking. *Gompholobium Huegelii* was the feature everywhere. Many of the *Leptospermum* bushes were bedecked with jewels in the shape of the little Emerald Cockchafers, *Diphucephala rugosa*. A solitary specimen of an orchid, which may have been *Prasophyllum brevilabre*, was collected, but has not been preserved. A number of cases of absence of chlorophyll in the leaves of several different species of plants were noticed, and the thought struck one. Had the dry season anything to do with this? So far as I can learn, the stone visited is the only rocking stone in Victoria; if any member knows of another I will be glad to have particulars.—F. G. A. BARNARD.

AN AUSTRALIAN BIRD IN MID-OCEAN.—In a letter to his father, Private S. B. Abbott, of the 4th Light Horse, in the First Expeditionary Force, and formerly a member of the F.N.C., says:—"A little brown bird like a lark, called a Pipit, has been with us since we left Port Melbourne, and is now quite tame. It lives chiefly on flies got in the stables."

CORRECTIONS.—In November *Naturalist*, page 103, lines 22, 23, for "specimens" read "specimen"; line 25, for "COTYPE" read "COTYPES."

In December *Naturalist*, page 124, line 19 from bottom, for "Macrocyprus" read "Macrocypris."

PLATE IV.

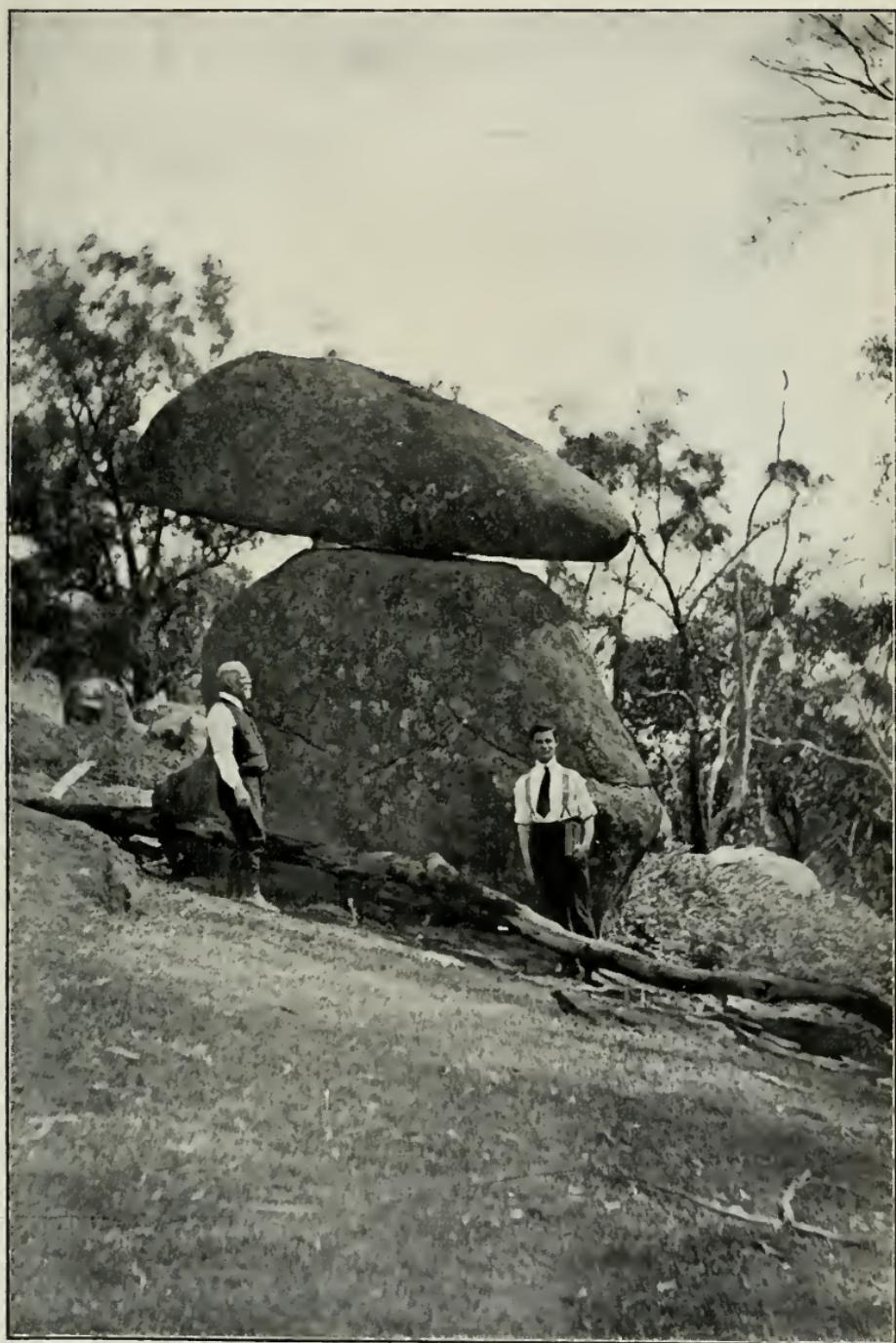


Photo. by F. CHAPMAN, A.L.S.

ROCKING STONE AT NARRE WARREN NORTH.

WHAT IS NARDOO?

BY E. H. LEES, C.E., F.R.A.S.

(Read before the Field Naturalists' Club of Victoria, 14th Dec., 1914.)

THE recent anniversary of the departure of the Burke and Wills expedition imparts special interest to this question, as Nardoo will ever be associated with its sad fate.

In an article in the *Australasian* some little time ago, under the heading of "The Explorer—Dietary Experiences," by Mr. E. J. Welch, the subject is but slightly referred to, and, in view of the uncertainty as to whether the plant *Marsilea quadrifolia*, Lin., common to swampy places throughout Victoria, is the "Nardoo" used by the Burke and Wills expedition, Mr. Welch, as a member of the Howitt relief party, was communicated with. In reply he distinctly asserted the identity of this *Marsilea* with the true Nardoo (*Vict. Nat.*, xxvii., p. 16).

From my own experiences with the Central Australian aborigines in Lake Eyre and Cooper's Creek district, I submit that this statement is not wholly accurate.

In regard to the *Marsilea*, it belongs to an order, *Marsileaceæ*, possessing only two genera, *Pilularia* (Pillworts) and *Marsilea*. The simplicity in order, however, is not continued in the genus, for *Marsilea* exhibits unusual variability even for cryptogamic species, and the desirability of uniting these was pointed out long ago by Baron von Mueller.

Examination of the plant, in various localities, evidences extraordinary variation. Hence also diversity of synonyms—*M. quadrifolia*, *M. Brownii*, *M. angustifolia*, *M. hirsuta*, *M. Drummondi*, *M. macropus*—different authorities claiming each to be the true Nardoo or clover fern.

Without discussing the variations of this very variously named plant, they may be summed up into two kinds—smooth and hairy-leaved. *Marsilea quadrifolia* belongs to the former; *Marsilea hirsuta*, as the name implies, to the latter. And this is Nardoo of the interior. It is a small creeping plant with filiform leaves, bean-shaped fruit (sporocarp) springing from the axils of the leaves. It produces no true seeds, but the fertile fronds (involucres) bear spore cases of two kinds, and these are collected by the natives and crushed between two stones into meal or flour. The lower stone is long and flat, with slight hollow, forming channel to the edge. The smaller stone is held in the right hand, and is used as a pestle, the tap-tap of the operation being audible for some distance.

In grinding, water is mixed to provide porridge or paste, according to the desired menu, the former running out by the channel into a piece of bark or wooden bowl. The paste is baked, and the porridge scooped up with crooked fore-finger, used as a spoon.

By itself, this Nardoo is indigestible and innutritious, and it is no wonder the diet is thus feelingly referred to by Wills in his journal—"I cannot understand this Nardoo at all. It certainly will not agree with me in any form; we are now reduced to it alone; and we manage to get from 4 lbs. to 5 lbs. a day between us. It seems to give no nutriment . . . Starvation on Nardoo is by no means very unpleasant, but for the weakness one feels, and the utter inability to move oneself; for, as far as appetite is concerned, it gives me the greatest satisfaction." As Mr. Welch graphically sums it up—"Nardoo alone meant a lingering fight with death."

But *Marsilea hirsuta* is not the only plant that furnishes true Nardoo. Various grass seeds, *Portulaca* seed, *Sesbania aculeata* (a leguminous plant with nutritious seeds), all are used. And, in regard to the latter, as long ago as 1880, Mr. F. M. Bailey, in "Proceedings Linnean Society N.S.W.," speaks thus:—"In North Queensland, according to Mr. T. A. Gulliver, the natives make bread of the seeds of the *Sesbania aculeata*. I am of opinion that this is the true Nardoo of the Cooper's Creek natives. The unfortunate explorers (Burke and Wills) might easily have mistaken the spore cases of a *Marsilea* for the shelled-out seeds of *Sesbania*."

Here, however, Mr. Bailey is mistaken. I know of no *Sesbania* where King was stranded, and most certainly the true Nardoo of Cooper's Creek is not confined to this plant. *Marsilea*, *portulaca*, and grass seeds all supply Nardoo. Further north edible leguminous seeds are obtained and utilized.

When engaged upon the trigonometrical survey of Central Australia my main dépôt was established for twelve months at Algebuckina water-hole, north of the Peake overland telegraph station. Upon one occasion I was returning, at the end of December, from a western exploration trip in the neighbourhood of Giles's "ever-flowing Ferdinand." Owing to dry stages and camel break-downs the work occupied longer than was anticipated, and we faced the return journey of six days with barely sufficient stores to last two days.

On the second day we struck water, and, notwithstanding the commissariat shortage, we had to spell the camels for a day. During this time our camp black (a Macumba River native) collected a supply of leguminous seeds, from which we made Nardoo. If not appetizing, it assuaged hunger, enabling us to fetch camp without distress, and it is certainly more digestible and sustaining than *Marsilea* Nardoo.

Later on I was camped for twelve months near the Charlotte Waters Overland Telegraph Station. The late Mr. Frank Gillen was then in charge. In the course of survey we pushed into new country, and on one such expedition I was accompanied

by Mr. Gillen, and we have partaken of leguminous Nardoo in aboriginal restaurants, where at that time English was unspoken and the white man little known. Unquestionably, Nardoo made from leguminous seeds is, as Mr. Bailey points out, a far more likely food than the wretched stuff made from Marsilea spore fruits. But the question is not whether Nardoo is nutritious, but, what is it? According to Mr. Welch, and, in fact, to every writer upon the subject, it is identified with Marsilea, or with some other specific plant. I maintain that this is not so. Nardoo is not a plant at all. It is a food obtained from several plants.

NOTES ON ENGLISH AND JAPANESE NEWTS IN VICTORIA.

By H. W. DAVEY, F.E.S.

(Read before the Field Naturalists' Club of Victoria, 14th Dec., 1914.)

IN March of last year I had the pleasure of reading before this Club some notes on the breeding of English newts in Victoria (*Vict. Nat.*, xxix., p. 190). Since that time I have added some Japanese newts to my collection, and now offer some further notes concerning both species.

The specimens referred to in my previous paper were hatched from eggs laid in November, 1912, and left the water as lung-breathing animals during February, 1913. At this stage they were merely miniatures of the adults, excepting that there was nothing by which to distinguish the sexes, but during the following April the sexes could easily be determined, as by this time the males had commenced to develop cutaneous crests, and also the pale blue stripe along the tail, which is characteristic of the males of this species. By the end of June some had developed very fine crests, and the blue stripe on the tail was by this time most pronounced. Some of the young newts of both sexes now take to the water. During July the water was intensely cold, and, probably on account of this, the females left the water, but the males continued to live in it, in spite of its low temperature. During August the females returned to the water, but both sexes were in and out of the water during night-time. The parents of these newts did not take to the water until the middle of September.

With frogs and toads, with one or two exceptions, impregnation of the eggs takes place after they have been extruded by the female, the same as in most of the fishes, but with the tailed Bactrachians as newts (*Urodeba*) the impregnation of the eggs is usually internal.

During springtime the female newt is usually accompanied by several males, often as many as six attending a single

female. The males at this season are exceedingly amorous, and may be seen constantly heading off the female by butting her with their heads, their tails in the meantime being violently lashed and rapidly coiled and uncoiled. These evolutions may continue for several days. The male then emits small packets of spermatozoa; these are collected by the female, who uses her hind legs for this purpose, in much the same way as in egg-laying. The bunch of spermatoza thus finds entry into the oviduct, and fertilization takes place.

It has often been stated that newts do not shed their skins during winter or on land, but I have frequently observed skin-shedding on land and during the winter months; but as there is no true hibernation in Victoria for them, this probably accounts for this winter skin-shedding. Once a male newt develops its dorsal crest it never entirely loses it again, but during the winter spent on land this crest is mostly absorbed, and dwindles down to small proportions. This absorption can be made to take place at any time, for if a male is kept from the water for a few days the crest will dwindle down to the winter proportions; the same thing occurs if newts are kept in vessels containing hard water, or even if kept in fish-bowls in soft water. On the other hand, the crest can be again developed by giving perfect conditions in the matter of water, light, and food.

The English Newt, *Molge cristatus*, takes three years to attain full size, and in Europe, so far as I can learn, it does not breed before reaching that age, but the young of this newt that were bred in Victoria, although not yet two years of age until November, 1914, have already laid eggs that have produced larvae, notwithstanding that it will take another year before the parents reach full size.

The newt, *M. cristatus*, only remains in the water during the spring and summer months, leaving the water in early autumn, and leading a purely terrestrial life, in moist situations.

In March, 1913, I received direct from Japan several specimens of that strikingly beautiful creature the Fire-bellied Newt, *Molge pyrrhogaster*. These newts are very different in appearance from the various European and American species. The males of this species never develop the cutaneous crest on the back, and the head is much more toad-like, being furnished with large parotid glands; the males also have a wavy crenulation of skin on each side of the body, and also along the ends of the ribs, which remind one of that fine Spanish newt, *Molge waltli*; and to the uninitiated the sexes are very much alike in appearance during the winter months. The males during the breeding season are very prettily adorned. The throat and belly are of a beautiful fiery crimson, with small black, irregular markings; the jaws

and sides of body are of a lovely turquoise-blue; the tail is alternately barred vertically with blue and black, and there are often splashes of crimson on the shoulders of both sexes. These colours are only produced when newts are living under ideal conditions, and are never obtained by newts kept in glass aquaria. This newt is decidedly a more voracious feeder than *M. cristatus*, and much more aggressive, and certainly more aquatic, than most newts.

English newts spend fully six months of the year continuously on land, whereas the Japanese species will remain in the water the whole year; but during the very cold weather they undergo a partial hibernation, as they seldom rise to the surface for air, whereas during warm weather they rise to the surface at frequent intervals.

An interesting instance of limb reproduction came under my notice. A male Japanese newt, *M. pyrrhogaster*, on arrival, in March, 1913, had a hind leg badly damaged; this later on became very swollen, and finally dropped off close up to the body. After an interval of six weeks a tiny black, pimple-like excrescence appeared at the spot the leg had fallen from. From this point five tiny toes sprouted; these gradually increased in size; later on a wrist appeared, then a knee-joint, and now (October, 1914) there is little to distinguish it from the leg on the opposite side of its body, excepting that it is slightly smaller and much darker in colour and the toes are much more webbed.

Japanese newts have been busily engaged egg-laying from August last until the present time (October). The embryo of the egg is white on one side and brown on the other; in this they differ from those of the English newts, the embryos of which are entirely white. A good number of the larvae have already emerged. The only apparent difference between these and those of *M. cristatus* at this stage is that the eyes are much more pronounced in *M. pyrrhogaster* than in the latter.

Egg-laying is carried on in much the same manner as with other newts. A female selects some aquatic plant for the purpose—the denser the better—and places a single egg in a fold of a leaf, hiding the egg as much as possible from sight. The necessity for all this care is at once apparent, as the males are most assiduous in their search after eggs, of which food they are extremely fond, and once an egg is discovered in a leaf this is torn and dragged at by the male until at last it can reach the egg, when, with one snap of the jaws, the egg disappears. Both sexes will also greedily devour the young larvae, and it is probably this cannibalistic trait that prompts the female to lay her eggs singly, folded in leaves of water-plants, and the denser these are the better suited for her

purpose, as the eggs are better hidden, and greater opportunities for escape are afforded to the newly-hatched larvae.

The larva, on breaking loose from the egg, is rather a helpless creature for some days, and spends most of its time lying on the bottom of the pond, or clinging to some plant or other object in the water. It is at this time that great numbers of them are eaten by the adults of their own and other species, who are most diligent in their search after them.

When disturbed the larva makes a dash away for a short distance before settling down again. Aquatic beetles and their larvae, bugs, and small fish also feed largely upon them at this stage, but the newt larvae soon gain strength and swimming powers, and with greater ease escape their enemies, and can more safely emerge from the cover of the water-plants into more open water. Their growth is now rapid. The length of time taken by *M. cristatus* to mature from hatching to the lung-breathing state in Victoria varies from 93 to 108 days.

NOTES ON THE COLEOPTERA OF NORTH-WESTERN VICTORIA.

PART VI.*—NITIDULIDÆ, TROGOSITIDÆ, COLYDIDÆ.

BY J. C. GOUDIE.

(Read before the Field Naturalists' Club of Victoria, 14th Dec., 1914.)

By the end of February the majority of flower-haunting and leaf-eating beetles has passed away. However, by searching under the bark of trees, under logs, &c., or in ants' nests, many of the species referred to in this paper may be found throughout the autumn and winter. Some of them, in fact, are not procurable at other times, as in the case of myrmecophilous beetles. Good observers have noted that these curious insects appear to be absent from the nests during the summer months. The activity and pugnacity of many kinds of ants on a hot day, however, might result in conclusions being hastily arrived at, so that further investigation on this point is necessary.

NITIDULIDÆ.

1716. *Brachypeplus basalis*, Erichs.

1728. *Carpophilus aterrimus*, MacL.

These are small, dull-coloured beetles, usually found under bark or amongst vegetables, &c. They have shortened elytra.

* Previous parts of this paper appeared in the *Victorian Naturalist*, vol. xxvi., p. 39; xxvii., p. 153; xxviii., p. 117; xxix., p. 72; and xxx., p. 189.

B. basalis is nearly black, with the base of clytra infuscate; *C. aterrimus* is smaller, with lighter-coloured appendages.

1750. *Soronia amphotiformis*, Reitter.

This little, flat species is often met with, always under the loose bark of trees. It might be described as a miniature "Tortoise-beetle," the outer margins of prothorax and elytra being strongly explanate or flattened out into a rim. It is light brown, with blackish markings on the elytra, and about $\frac{1}{6}$ of an inch long.

1753. *Thalycrodes australe*, Germ., M. C. Supp., p. 739.

A rare species. It is oval, convex, with dilated tibiæ and striated elytra. The antennæ are short, strongly clubbed. It is dark brown, with the base, along suture, and apical third of elytra infuscate. Habits unknown to me, a single specimen being found in flood waters. Length, 3 mm.

1755. *Cychramptodes murrayi*, Reitter.

A smooth, convex insect, $3\frac{1}{2}$ mm. in length, piceous in colour. It may be recognized by the broad explanate prothorax (broader than elytra), which quite conceals the head from above. Two specimens taken under bark.

Ips, Fabricius.

In the Birchip district there occurs a species, at present unidentified, belonging to this genus.

TROGOSITIDÆ.

This family is sparingly represented in Australia. The largest genus, *Leperina*, with 14 species, contains nearly half the described forms. They are met with either under the bark of trees or hiding in the crevices of same, and are carnivorous in habits, according to Mr. Froggatt.

1770. *Tenebriodes mauritanica*, Linne.

This flat, black, Carab-like beetle, commonly known as the "Cadelle," is too well known to need description. Wherever wheat in bags has been stored a few months it is almost sure to be found, being a cosmopolitan species.

1777. *Leperina lacera*, Pasc.

Is a curious-looking insect, studded over the upper surface with erect fascicles of black scales. The general colour is black, with a patch of white scales along the outer margins of prothorax. A few white scales are also scattered over the elytra and prothorax, causing a mottled appearance. It measures $\frac{3}{8}$ of an inch.

7932. *Neaspis pusilla*, Blackb.

This little greyish beetle, with brown spots or blotches on the elytra, is often taken under the bark of dead trees.

COLYDIDÆ.

The Colydidæ are generally small, slender beetles with costate elytra, living under the bark of trees or in ants' nests. The legs being short and feeble, they creep about slowly as if crippled.

Sparactus productus, Reitter

A sooty black species about 3 mm. in length. Elytra strongly costate. The humeral angles of prothorax are produced into a strong conical tooth.

7951. *Ditoma parva*, Blackb.

Similar in appearance and habits to preceding.

D. villosa, Lea, Proc. Roy. Soc. Vic., xxiii. (new series), part 1, p. 209, plate xxvi., fig. 23.

This is a small, reddish-brown beetle, $3\frac{2}{3}$ mm. in length, covered with long, straggling, yellowish hairs. The sides of prothorax are strongly serrated, with the anterior angles decidedly produced. Elytra having the margins finely serrated, with close, regular rows of large punctures. Two specimens taken in nests of *Crematogaster lœviceps*, near Birchip.

7955. *Meryx equalis*, Blackb.

A rather uncommon species, found under logs or dry leaves. The head and prothorax are reddish-brown, the elytra mottled chocolate-brown. It is about $\frac{1}{2}$ of an inch in length.

1803. *Deretaphrus ignarius*, Pasc.

An elongate, parallel-sided insect, 9 mm. in length, dark brown or nearly black. Antennæ and legs short. The prothorax is narrowed to base, strongly punctate, with a deep median groove not quite reaching to apex. Elytra strongly costate. It occurs under bark, and is often found in the old tunnels of longicorn beetles.

7968. *Bothrideres tibialis*, Blackb.7969. *B. variabilis*, Blackb.

These are very like *Deretaphrus* on a small scale (3.5 mm.), with similar habits, but instead of the median sulcus there is a deep fovea near the base of prothorax.

Kershawia rugiceps, Lea, l.c., xxii. (new series), part 2, p. 329, plate xxvii., fig. 6.

This is one of the novelties found living in ants' nests, for which a new genus was formed, and which so far contains but the one species. It is of a rusty-brown colour, $3\frac{1}{2}$ -4 mm. long. The antennæ are short, moniliform, last joint largest and truncate at apex. The head, prothorax, and elytra, in addition to being roughly punctate, are strongly carinate, and the tibiæ widely dilated. Taken at Birchip and Sea Lake, in nests of *Iridomyrmex nitidus*.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held in the Royal Society's Hall on Monday evening, 11th January, 1915.

The president, Mr. J. A. Kershaw, F.E.S., occupied the chair, and about 40 members and visitors were present.

REPORTS.

A report of the Christmas-New Year excursion to the National Park, Wilson's Promontory, was made by the leader, Mr. J. A. Kershaw, F.E.S., who stated that a party of twelve left Melbourne on the morning of 26th December, and reached the Park that day. The permanent camp was established near the Tidal River, and from this base excursions were made to the most accessible beauty spots in the vicinity. The outing proved highly interesting and enjoyable to members generally. The report, which was illustrated by lantern slides reproduced from views taken on this and on previous excursions, was productive of some discussion relative to the necessity of inducing the Government to advertise, more extensively than heretofore, the existence and whereabouts of the National Park, and of affording the general public better facilities than those now existing of reaching the reservation.

Mr. F. G. A. Barnard supplemented the report with some notes on the botanical features of those portions of the Park visited by members of the party.

ELECTION OF MEMBERS.

On a ballot being taken, Mr. E. Allman, 143 Lennox-street, West Richmond, was duly elected as an ordinary member, and Mr. J. W. Hosking, 47 Parade, Norwood, South Australia, as a country member of the Club.

REMARKS ON EXHIBITS.

Mr. F. Pitcher, in drawing attention to his exhibit of flowering branchlets of *Acacia elata*, *A. linearis*, and *A. pruinosa*, said it is worthy of note and record that a large number of native and exotic trees in the Melbourne Botanic Gardens, as well as in the public and private gardens around Melbourne, are displaying unusually large masses of bloom this season. These are of a good and specially brilliant character in many instances. One is inclined to attribute the cause to the facts of the last winter and early spring being abnormally dry. It is considered that the usual activity of the plants in

producing new growths of foliage was retarded and modified by the absence of moisture in winter and early spring, and that the energy of the plants became more fully developed later in the flowering time. The early summer rains, too, may have assisted materially in the present fine results.

POSTPONEMENT OF PAPER.

Owing to the report on the National Park (Wilson's Promontory) excursion, and the resulting discussion thereon, occupying practically the whole of the evening, Mr. F. Chapman's paper, "Note on a Large Specimen of *Conus dennanti*," was held over till the February meeting.

NATURAL HISTORY NOTE.

Mr. F. Wisewould stated that a pair of White-shafted Fantails had constructed a nest and reared a brood in the immediate vicinity of his residence at Upper Pakenham. The birds were not molested in any way, and were always treated with kindness and consideration. The resulting consequence is that the two generations have now become perfect pests in and about the house. The young are escorted into the kitchen by the parent birds, placed on some convenient perch, and there regaled with flies and other food, collected, very often, at times most inconvenient to the inmates of the house. It is absolutely impossible to read beside an open window, by reason of the habit acquired by the birds of perching on one's head or other convenient portion of the body. A short time ago, whilst giving instructions to one of his *employés* respecting repairs to a portion of the front verandah, one of the birds had the bad taste to perch upon that worthy's upturned nose. Recently his daughter, when preparing a pudding in a basin, had to push one of the birds off the rim to prevent it becoming mixed up in the batter.

EXHIBITS.

By Mr. J. W. Audas, F.L.S.—A living specimen of the native black snail, *Paryphanta atramentaria*, collected by the exhibitor at Beenak, 31/12/14.

By Mr. F. G. A. Barnard.—Specimens of flowers and fruit of *Banksia serrata*, L., from Wilson's Promontory.

By Mr. F. Pitcher, on behalf of the Curator of the Melbourne Botanic Gardens.—Flowering branchlets of *Acacia elata*, Cunningham, Cedar Acacia, *Acacia linearis*, Sims, Narrow-leaved Acacia, and *Acacia pruinosa*, Cunningham, Frosty Acacia.

By Mr. A. L. Scott.—Specimens of copper ore, &c., from Mount Lyell, Tasmania.

After the usual conversazione the meeting terminated.

EXCURSION TO NATIONAL PARK, WILSON'S PROMONTORY.

ON two previous occasions the Club has undertaken extended excursions to the National Park—the first during Christmas, 1905, before the whole of the Promontory had been permanently reserved, when the western coast as far south as Oberon Bay was visited; and the second during Christmas, 1912, when the Vereker Range and the adjacent country was explored.

On the present occasion, while necessarily covering much of the ground traversed on these earlier trips, some new localities which have been recently opened up by the Committee of Management of the Park were visited. Our party of twelve consisted of the following:—Messrs. E. Allman, F. G. A. Barnard, J. Barr, W. Kernot, L. N. Kershaw, L. K. M'Nab, J. G. O'Donoghue, O. W. Rosenhain, J. Shephard, B. L. Stanton, H. Whitmore, and J. A. Kershaw (leader).

Leaving Melbourne by the 6.30 a.m. train on Saturday, 26th December, we reached Foster (110 miles), where lunch had been provided, shortly after mid-day. Bennison, three miles further on, completed our railway journey, and here we were joined by some members of the Committee of Management, who were also visiting the Park on their annual inspection. Among the latter were two of our members—viz., Prof. A. J. Ewart, who represents the Club on the Committee of Management, and Dr. T. S. Hall, representing the Royal Society. Continuing our journey by horse tram for another mile and a half, we reached Port Franklin, a small fishing village on the Franklin River, where we found our motor-boat awaiting us. Transferring our baggage to the boat, we proceeded down the river. We were fortunately able to leave on a rising tide, the extensive mud-flats bordering the river to its mouth being still uncovered, and, as usual, swarming with countless numbers of the small Mangrove Crab, *Helaeius cordiformis*. Here and there groups of birds, including Curlews, Blue Cranes, Hooded Dottrels, together with Pacific and Silver Gulls, wandered over the mud, while on the sand-banks at the mouth of the river were seen numbers of Black Swans, Pelicans, and Cormorants. The river, more especially on the western side, is margined with a thick growth of the Spurious Mangrove, *Avicenaria officinalis*, whose green foliage is a pleasing contrast to the bare, muddy banks. Leaving the mouth of the river, we steered a course for Doughboy Island, where we landed and spent an hour or so while waiting for the incoming tide to rise sufficiently to enable us to cross the shallow sand-banks between the channels. Our trip across had been a rather wet one, as, besides some slight showers, we had been running against wind and tide,

causing the spray to occasionally break over our boat. On the island, however, this was soon forgotten, and we spent the time at our disposal on the short, sandy beach, or examining the features of the island. During a previous visit no less than 50 species of plants were noted, and we were unable to add to these on this trip. Among the thick growth of bracken on the sheltered (or eastern) side of the island is a fairly large Mutton-bird rookery, which is now being carefully preserved. Here we saw several of the parent birds running quickly through the ferns or in their burrows.

Continuing our journey, we reached the jetty at the southwest corner of the Inlet about 7 o'clock, and were soon busily occupied removing our baggage to the rest-house close by. While some assisted in preparing our evening meal, others erected one of the tents, and, generally, made everything comfortable for the night.

On Sunday morning we were early astir, and, while our camp assistant prepared breakfast, we re-packed our belongings for removal to the Darby by pack-horses. One of the first discoveries was a Koala perched in a gum-tree in front of the rest-house, close to which a Boobook Owl was observed the previous evening quietly surveying the unusual bustle. Our pack-horses arrived at 8 o'clock, as arranged, and then began the work of loading them with our bulky baggage. It is useless for an inexperienced person to attempt to load a pack-horse. If he does he will soon find the packs dropping off one after another, or the saddle working round under the horse. We were, however, very fortunate in having an energetic and experienced worker in our secretary, Mr. O'Donoghue. With the help of our camp assistant, Mr. O'Donoghue superintended the packing, while we all assisted as far as possible. Our third horse had just been packed, and the straps tightened up, when he became restless. All attempts to quieten him proved useless, and he finally brought matters to a head by an exhibition of buckjumping that, while being creditable to him, was rather disastrous to us. When he had quite finished there was a circle of swags and packages all round him, while the pack-saddle was where the girth ought to have been. It was finally decided that he was not suitable, and we transferred the packs to a spare riding horse.

From the rest-house at the Vereker landing to the Darby (6½ miles) is a well-defined track, winding for the first mile or so through the excellent banksia forest already described in the accounts of previous trips. Birds were numerous, among those seen being the Black and Sulphur-crested Cockatoos, King Parrot, Crimson Parrot, Black-faced Cuckoo-Shrike, Grey Bell-Magpie, Wattle-bird, and Bronzewing Pigeon. The

common Black-tailed Wallaby, *Macropus ualabatus*, is plentiful here, and occasional Koalas are met with in the eucalypts. Passing through the gate in the boundary fence, the track passes outside the Park boundary, and crosses an expansive heathy flat, devoid of timber, but from which excellent views of the ranges to the east and south can usually be obtained. Unfortunately for us, a misty rain had been falling all the morning, and heavy mountain mists obscured the tops of the hills, altogether spoiling our view; but still we could make out Mount Vereker in the east and Mount Leonard and the Darby Saddle to the south. On our right were seen a row of rather picturesque low sand-hills, once bare, but now covered with grass and short scrub. Earlier in the season this flat is bright with red, pink, and white Epacris and flowering shrubs of various kinds. Quail are common, and occasionally the rare Ground-Parrot, *Pezoporus formosus*, has been flushed here. About three miles from the Darby we entered what was once a thickly-timbered eucalyptus forest, where, only a few years ago, native bears (Koalas), wallaby, and occasional introduced deer might be seen, but which is now only a mass of dead and bleached trees. Passing again into the Park, where the green trees throw a pleasant shade, and traversing the northern edge of the Darby swamp, we were joined by one of the Park emus—a full-grown bird, which, together with its mate and four half-grown young birds, frequent this portion of the Park. This bird came close to our party, occasionally uttering its deep drumming note and spreading out its long neck feathers, and accompanied us towards the Darby. A very fine view of the extensive Darby flat is obtained here, showing the ranger's and committee's cottages and the rest-house, clearly backed by the steep scrub-covered sand-hills which separate the flat from the ocean beach, while the river is seen winding through the impenetrable tea-tree towards the foot of Mount Vereker. The track leading southwards towards the lighthouse is seen winding round the steep hills on the western slope of Mount Leonard.

Crossing the Darby River at its only bridge, which really forms the entrance to the National Park, and from which can be seen Shellback Island standing out clearly opposite the mouth of the river, a well-formed track winds along the southern bank of the river to the Darby flat, where the second rest-house is situated. On the river Black Swans, Black Duck, Water-hens, Grebes, Cormorants, Nankeen Herons, and Blue Cranes make their home. The Black Duck, Water-hen, and Grebe breed here, and in the season may be seen with their young brood on the water, while in the river are numerous eels, *Anguilla australis* (?), Tupong, *Pseudaphritis urvillei*, and minnows, or so-called Mountain Trout, *Galaxias attenuatus*.

During the process of unpacking, several of the party refreshed themselves by a swim in the river or the ocean, and, after a good lunch, it was decided to put in the rest of the day here and camp for the night, instead of pushing on to the Tidal River, as originally intended. While some of the party elected to explore the immediate vicinity of the river, the remainder visited Tongue Point, a narrow, scrub-covered point jutting into the sea about three miles below the Darby mouth. A well-defined track leads over the high hill separating the Darby flat from the ocean, and winds in and out among low scrub, stunted eucalypts, and sheltered belts of sheoaks. All along this track were to be seen the recent tracks of emus, kangaroos, wallabies, and wombats—conclusive evidence that these animals, introduced into the Park by the Committee, are well established. On the journey an occasional wallaby was seen, and many native birds, including the small Emu-wren, were noted.

The excellent view usually obtained from Tongue Point, a favourite spot for tourists, was again marred to a great extent by the mists, but still good views of the numerous islands, such as the Glennie and Anser Groups, Norman and Shellback Islands, were obtained. This point is well worth the walk if only to see the enormous weather-worn granite boulders, of all shapes and sizes, which are scattered about in great, confused masses all along the shore-line. Near the end of the point, at the base, as it were, of the tongue, the sea has almost cut its way through and made an island of it. In the great fissure thus formed are stupendous granite boulders which have slipped down from the steep sides of the hill opposite, while other similar masses are apparently ready to slip down at any moment. The point itself is thickly covered with short shrubs of various kinds, many of which were in flower, and duly noted by our botanists. The trip was greatly enjoyed, and camp was again reached about 7.30 p.m., where, after a refreshing tea and the usual enjoyable camp.chat, all turned in to enjoy a well-earned rest.

Monday, 28th December.—An early start was made to re-pack our horses, which our previous experience enabled us to accomplish more readily, and we were again on the track. Passing through the gate of the Park, we came upon a fine group of five or six emus, so tame that they would hardly move out of our way. The track led through a fine grove of banksias, *B. serrata*, thence over and around the slopes of some scrub-clad hills to the timbered slopes of Mount Leonard, which towered up on our left to 1,860 feet. Here we met with our second Koala, and from now on these animals, together

with the Black-tailed Wallaby, were constantly being seen. The track, winding in and out along the hill-sides, was in places so steep as to cause those leading our pack-horses some concern; but from the tops of these hills extensive and beautiful views of the coast-line and adjacent islands were obtained, and well repaid our exertions. The track crosses here and there small gullies, in some of which are numerous ferns, the King Fern, *Todea*, being common.

After crossing Whisky Creek, a very steep pinch, and an adjacent gully, we ascended a steep hill, from the summit of which was obtained an excellent view of the surrounding country. In front is Mount Oberon (1,968 feet) and the Bad Saddle between it and the high peak overlooking Norman Point. On our left is Bishop Rock, an exceedingly steep granite point overlooking the undulating hummocky country between it and the sea, while on our right is a pretty view of Leonard and Norman Bays, with Norman Island, the Glennies and Anser Groups standing off the mainland. One track leads off to the right on to the beach at Norman Bay, the other to the left over the undulating, scrub-covered sand-hills to the crossing over the Tidal River at the foothills. We followed the latter, and, crossing the Tidal River, not without occasional stoppages to readjust our packs, we traversed an extensive marsh to the foot of the northern slope of Mount Oberon. Turning eastward we followed the telegraph line into a well-timbered and sheltered valley. Here the telegraph line ascends steeply over another bad saddle on the eastern slope of Mount Oberon and descends into the marshy country behind Oberon Bay. Leaving the telegraph line, we entered the valley between the Wilson and Ramsay Ranges, and reached our camp, situated close by a beautifully clear, fern-bordered creek.

The camp consisted of two large sleeping tents and a dining tent large enough to accommodate the whole party. Our surroundings were made as comfortable as many willing hands could make them, and we settled down to enjoy our stay. The clear running stream close by provided us with good water, both for consumption and bathing, the latter being specially enjoyed, notwithstanding the presence of numerous leeches and occasional scrub-ticks. After fixing up the camp, the remainder of the day was devoted to exploring our immediate surroundings.

Tuesday.—Early rising is the rule with our Club camps, and 5 o'clock a.m. was not considered too early to start our day's operations. A morning dip, then breakfast and away, was our programme. This morning an early start was made for Sealers' Cove, on the eastern coast. The track commenced

not far from our camp, where it followed up the very steep northern slope of the Oberon Range to what is known as the Bad Saddle. It is here that the telegraph line, which connects Foster on the mainland with the lighthouse on the extreme southernmost point of the Promontory, crosses this range. The Sealers' Cove track proper commences near this saddle, and winds about along and near the top of the Wilson Range to a saddle connecting Mounts Ramsay and Wilson, from where it descends in a gradual and easy grade along the slopes of the hills into Sealers' Cove. This track was formed under the supervision of the Public Works Department for the Committee of Management, and covers a distance of about seven miles. It is about 4 feet broad, and is constructed for riding or walking. It opens up some magnificent fern gullies, both on the western and eastern slopes, some of the large Slender-stemmed Tree-ferns, *Cyathea Cunninghami*, in the eastern gullies towering fully 50 feet high. The scenery along this track is all that can be desired. On the western side of the saddle it commands extensive views over the Tidal River valley and adjacent hills and the ocean beyond, with the islands standing out clearly, while from the eastern slopes are obtained beautiful views of the Wilson Range opposite, and Sealers' Cove, with the Cliffy Island group, in the distance. Numerous small streamlets cross the track, and well-sheltered camping places have been formed for those desiring to pass the night among the hills. In places the track passes among and under great tree-ferns, blackwoods, and lilly-pillies, where the Lyre-birds, recently introduced, have already established themselves; or through dense growths of tall hazel, musk, and blanket-wood scrub, and along the old deserted tramway track, finally opening upon the broad sandy beach, immediately opposite a long jetty running into deep water, on the southern side of which the Sealers' Creek empties itself.

The jetty, originally erected for the purpose of loading timber cut by a saw-mill then situated near the beach, has long been neglected and fallen into decay, but it is understood this is now to be put into good repair. It will then be possible for parties to land here from the small coastal steamers, and walk or ride through the Park to the mainland. Although, as a rule, the dense growth of the timber and undergrowth on the steep slopes of the hills on either side of the track would not permit of any divergence for collecting purposes, there were opportunities on the track itself for a certain amount of collecting and observation. Bird and plant life was observed as we passed along, while fallen timber, &c., was turned over in search of ground-frequenting animals. Birds were fairly numerous, but often difficult to recognize. Among those noted

were the Coachwhip-bird, *Psophodes crepitans*, Thickhead, *Pachycephala olivacea*, White-eared Honey-eater, *Ptilotis leucotis*, Rufous Fantail, *Rhipidura rufifrons*, White-shafted Fantail, *R. albiscapa*, Striated Tit, *Acanthiza lineata*, Yellow-rumped Tit, *A. chrysorrhoa*, White-eye, *Zosterops cærulescens*, Black Cockatoo, *Calyptorhynchus funereus*, Sulphur-crested Cockatoo, *Cacatua galerita*, and Gang-Gang Cockatoo, *Callocephalon galeatum*. All along the track the common lizards *Hinulia quoyi* and *H. whitei* were exceedingly numerous, and several Blue-tongued Lizards, *Cyclodus*, were seen.

The trip occupied the whole day, and was full of interest, and, notwithstanding the rather long walk, none regretted the undertaking.

Wednesday.—It was arranged to devote to-day to a visit to Oberon Bay *via* the western Bad Saddle. Unfortunately, shortly after our early start a fine rain came on, and continued at intervals throughout the morning. The first part of our journey followed along the northern foot of Mount Oberon, where, at one time, a narrow cattle track could be followed. This had, however, become quite overgrown, and we had to make a track for ourselves, in some places through tangled masses of scrub and sword-grass reaching over our heads. The wet scrub and the falling rain soon saturated our clothes, while the heavy mists quite obscured the mountain tops. We, however, pushed on, and soon found the track leading up the steep mountain side to the Bad Saddle. The long, steep climb was rather trying for some of the party, but, had the day been clear, the fine view to be obtained would have quite repaid the exertion. Descending the mountain on the Oberon Bay side was much more easily accomplished, and we had a good view over the bay and of Mount Norgate (1,390 feet) while winding round the hillsides to the beach. Crossing Growler's Creek at its mouth, we traversed the broad, clean, sandy beach to a small creek at its southern end. Following this up for a short distance, we entered upon the well-known grassy flat behind the sand-hills, the home of scores of Koalas, to Fraser's Creek, where we lunched on the exact spot where the Club's first party camped in December, 1905. A light lunch and a hot cup of tea soon restored our spirits, notwithstanding the occasional light showers and our wet clothes. Numbers of Koalas were seen, and numerous photographs taken. Attention was drawn to the numbers of dead or dying gum-trees in the flat, nearly all of which had been quite or partially depleted of their foliage within the last few years by the Koalas which frequent this sheltered locality.

Owing to the state of the weather, it was decided to make

an early start back to camp. As we reached the steep slopes of Oberon again the weather cleared considerably, so that a good view of the surrounding country and islands was obtained. Descending the mountain, we varied our course by following along Norman Bay to the Tidal River, thence across country to camp.

Thursday.—To-day seven members of the party visited Lilly-pilly Gully, situated among the hills near the head of the Tidal River; two others explored the Bad Saddle and part of the Sealers' Cove track; while three elected to return to the Darby, and so save a long walk on the following day.

Lilly-pilly Gully, so named from the presence of numerous Lilly-pillies, *Eugenia Smithii*, was only recently explored by the Committee of Management, with the result that a short bridle-track has been formed into it. This has made accessible what proves to be the most beautiful of the fern-gullies in the National Park. The growth of the ferns of various kinds is wonderful, the Polypodium covering the ground and tree-trunks, while enormous lilly-pillies and blackwoods are plentiful. The Slender-stemmed Tree-fern, *Cyathea Cunninghamii*, is common, growing to a height of 20 or 30 feet. The gully should be of particular interest to the botanist, and is deserving of a more careful survey than we were able to give to it. It is in its wild state, and, so far, untouched by bushfires. An enjoyable and interesting day was spent here, and we returned to camp well satisfied with the trip.

Friday.—We broke up camp at an early hour, and, packing our horses, returned to the Darby in time for mid-day lunch. After a rest here we continued our journey to the Vereker rest-house, which was reached about 6 o'clock. Our evening meal, as on a previous visit, was prolonged by a few speeches, in which members took the opportunity to express their appreciation of the valuable work done by the Committee of Management in opening up and stocking the Park, and the facilities afforded tourists for seeing its beauties. To show their appreciation in a practical manner, the members unanimously decided to subscribe five shillings each towards providing additional conveniences in the rest-houses.

Saturday.—After an early breakfast, our belongings were packed up and taken aboard the motor-boat awaiting us, and a pleasant trip across the inlet terminated an enjoyable eight days' camp in the National Park. From a collector's view, I am afraid that this trip will add little to our knowledge of the fauna and flora of the Park. In zoology, nothing deserving of special mention was obtained beyond what has already been recorded in the *Naturalist*.

I am indebted to Mr. Barnard for the following notes on the botanical features of the trip. He says:—"Entering the Park at the Vereker landing, one could not help being struck by the unique effect created by the numerous fine banksia trees, *Banksia serrata*, which at a little distance have the appearance of a well-tended orchard. Their flowering spikes in many cases were from nine to twelve inches long and proportionately thick. When the seeds are ripe they form a favourite article of diet of the Black Cockatoos. Here and there were fine spikes of the Pink Spotted Orchid, *Dipodium punctatum*. At the Darby River we found a nice fringe of shrubs and plants along the bank, comprising many species, among which *Swainsona lessertifolia* was conspicuous by its dark purple flowers. The plants of the Promontory have been so well listed by the two previous Club excursions and the three special collecting trips organized by the National Herbarium, the results of which have appeared in the *Naturalist*, that there is no necessity to again refer to the several species in detail. During the walk to Tongue Point several novelties to the new-comer were seen, such as *Thomasia petalocalyx*, a shrub with pretty pink flowers, belonging to the natural order Sterculiaceæ; the red-flowered variety of *Correa speciosa*, *Correa alba*, and *Alyxia buxifolia*. *Kunzea corifolia* had been making a fine show, but was just over. During the walk to Tidal River the Wedding-bush, *Ricinocarpus pinifolius*, was found in fruit, and the reason for its generic name easily seen, for they resembled in miniature those of the well-known castor-oil tree. Large patches of Coral Fern were seen near the Tidal River, while in the moister parts the delicate purple flowers of the Bladderwort, *Utricularia dichotoma*, were fairly common. It had been anticipated that some plants or shrubs would have occurred in sufficient abundance to have given colour to the landscape, but at the time of our visit half an acre or so of *Hakea pugioniformis*, with creamy white flowers, was the only decided patch we came across. Earlier in the season *Pultenæa daphnoides* and *P. Muelleri*, which occurred in abundance near the site of our camp, must have given a tinge of colour to that locality. During the trip to Sealers' Cove, knowing that the list of ferns recorded could probably be augmented, I devoted some attention to those plants, and added *Lomaria fluviatilis* to the list. It is quite probable other species will yet be found here, but our time was too limited to allow us to leave the track. Many shady fern-glades were passed which one would have liked to have stopped and explored, but they had to be rapidly passed by. Many of the tree-ferns were clothed with *Asplenium flaccidum*, a somewhat rare fern in the gullies nearer Melbourne. A search was made

for seedlings of *Cyathea Cunninghami*, a tree-fern which most of us saw for the first time in a state of nature; and, though full-grown specimens twenty to forty feet high were fairly abundant, and thousands of seedlings of *Dicksonias* and *Alsophilas*, the other two tree-ferns, could be seen alongside the track, only a solitary specimen which appeared to be a *Cyathea* was detected. Was it want of experience, or is the *Cyathea* a relic of past times, for no *Cyatheas* were seen under fifteen to twenty feet high. The absence of the Silver Wattle along the track, and, in fact, the few acacias recorded for the National Park, is one of its striking features to one used to the mountain-sides nearer Melbourne. During the trip to Oberon Bay the Common Heath, *Epacris impressa*, was flowering freely, but nearly always stunted, and almost smothered by the adjacent vegetation. Trailing on the sand-hills along the coast, *Lotus australis*, with its pretty pink pea-shaped flowers was conspicuous in several places. The final day of our stay was devoted to the upper Tidal River, where a track had recently been opened into a fern gully, which proved to be one of Nature's fairylands. Though we were unable to get very far up the gully, some five-and-twenty species of ferns were noted, the feature of the gully being the wonderful growth of a *Polypodium* which seems to agree with *P. scandens*, but as that species and *P. pustulatum* are so closely allied, and, in fact, seem to run into one another, it can only be provisionally recorded as new for the Park. However, *Aspidium decompositum* was found here, which has not yet been recorded for the Park, and another record is the variety *bifinnatifida* of *Lomaria discolor*, of which many fine plants were seen. The *Polypodium* not only grew on the tree-trunks up to twenty feet above the ground, but covered large areas of the ground to the exclusion of other species. These additions bring the fern flora of the Park up to thirty-six species, or just half the Victorian list: but no doubt other species could be added if more time were available."

The total cost of our eight days' trip, which includes railway fare, hire of pack horses, tents, provisions, &c., and camp assistant, amounted to £2 18s. 4d. per member, or at the rate of 7s. 3½d. per day.

In conclusion, I desire to express my thanks and those of the party to Mr. J. G. O'Donoghue, whose assistance and advice throughout the trip was greatly appreciated, and to Messrs. J. Shephard, J. Barr, J. G. O'Donoghue, O. W. Rosenhain, and B. L. Stanton for the loan of most of the photographs used to illustrate this report.—JAS. A. KERSHAW.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 8th February, 1915.

In the absence of the president, Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 35 members and visitors were present.

CORRESPONDENCE.

From Mr. F. Lewis, Acting Chief Inspector of Fisheries and Game, intimating that the following lakes, &c., in the Hattah district had been proclaimed a sanctuary for native game:—“ Lakes Hattah, Little Hattah, Brockie, Mournpoul, Yerang, Lockie, Konardin, Yelwell, and all lakes and channels connected therewith, together with all lands abutting thereon for a distance of 40 chains from high-water mark of all such lakes or channels, in the parishes of Konardin, Yelwell, Mournpoul, and Brockie.”

The chairman said the communication received from Mr. F. Lewis was the outcome of the representations made by several members of the Club, who, with another well-known ornithologist, had visited the Hattah district in September last. The result achieved, that of securing the reservation of a large area on the Murray flood-plain as a sanctuary for native game, was highly satisfactory, and was largely due to their efforts.

Mr. F. Pitcher suggested that a letter be written to Mr. Lewis, thanking him for the interest he had taken in the matter, and expressing satisfaction at the reservation of Mournpoul and the neighbouring lakes as a sanctuary for native game; and a resolution to that effect was moved and seconded by Messrs. J. R. Tovey and J. Gabriel, and carried unanimously.

REPORT.

In the absence of the leader, Mr. R. Kelly, Mr. Geo. Coghill read a report of the Foundation Day excursion to Warburton, which stated that the outing, extending from Saturday, 30th January, to Monday afternoon, 1st February, was attended by a small but enthusiastic party. Saturday was devoted to an examination of the shrubs along the Yarra banks in the vicinity of the township and up the valley to Backstairs Creek. On the following day the party journeyed to Cement Creek, where some fine specimens of the Beech, Sassafras, and other denizens of the high mountain ranges were noted. Big Pat's Creek was visited on Monday forenoon, and Scotchman's Creek later in the day. All plants noted on former trips were

seen, but, owing to the excursion being held later in the season than formerly, few were found in bloom. Some very fine specimens of *Lycopodium densum*, obtained from near the O'Shannassy Weir, were observed in the possession of many of the residents of the township.

REMARKS ON EXHIBITS.

Mr. J. R. Tovey drew attention to his exhibit of the Common Mistletoe, *Loranthus celastroides*, Sieber, growing on the Pepper-tree, *Schinus molle*. This is the first record of the Pepper-tree as the host-plant of the mistletoe. The branch on which the parasite flourishes was cut from a tree in the exhibitor's garden at Mentone. There are no trees affected with the mistletoe within a radius of two or three miles, so that the seed must have been carried some distance by birds.

On behalf of Miss O. B. Davis, M.Sc., he desired to bring under notice a specimen of the Common Mistletoe, *Loranthus celastroides*, Sieber, growing on the British Oak, *Quercus robur*. This is also probably a new record for a host-plant for this mistletoe. The specimen was obtained at Brighton.

Mr. C. J. Gabriel, in referring to his exhibit of marine shells (Victorian representatives of the genus *Conus*), said that, although these recent forms showed no similarity with the species referred to by Mr. F. Chapman, A.L.S., it is now being shown beyond doubt that many of our recent molluscan forms are represented in the Tertiaries. The percentage of survivors is being considerably increased, and it is very necessary that the fossils should not be overlooked when engaged on the description of new species of any recent forms.

Mr. F. Pitcher drew attention to his exhibit of blooms of *Acacia Maidenii*, F. v. M., Maiden's Acacia, and *Acacia retinodes*, Schlech., Bald Acacia, from trees now flowering in the Melbourne Botanic Gardens.

Mr. A. D. Hardy, F.L.S., asked if any member had heard the name Cashmere Wattle applied to *Acacia retinodes*.

Mr. E. E. Pescott said that most people resident in the vicinity of the Grampians recognized two types of *Acacia retinodes*—one that flowers only in the spring, and the other all the year round.

PAPERS READ.

I. By Mr. F. Chapman, A.L.S., entitled "Note on a Large Specimen of *Conus dennanti*."

In the course of some explanatory remarks bearing on his paper, Mr. Chapman said the genus *Conus* was well represented in the Tertiary beds of Victoria, one of the most common species being *Conus dennanti*. In common with other organisms, the cone shells evidence responsiveness to climatic change, and striking climatic changes had evidently occurred even during

the Tertiary period. In illustration of this he referred to the large *Conus* shells of Mauritius and of the Queensland coast living at the present time, which dwarf the smaller Victorian species; and the same obtains with the sea-urchins and other animal forms. A fine series of recent Victorian and exotic specimens of the genus *Conus* were shown by Mr. C. J. Gabriel to illustrate the paper.

2. By Mr. J. G. O'Donoghue, entitled "Wanderings on the Murray Flood-Plain."

The author gave a description of a vehicular journey from Mildura to Lake Mournpoul, a distance of nearly 70 miles along the Murray flood-plain, and particulars of a subsequent sojourn at the lake mentioned.

Mr. J. R. Tovey said the author had referred to the introduced *Verbesina encelioides* as being credited by station-owners with poisoning stock. As was pointed out, no species of the genus to which the "Crown-beard" belongs is known to be poisonous, but fatal results often attend the consumption of the plant in great quantities by stock. This ill effect was due to impaction induced by the matting of the hairs of the plant in the stomach.

LIST OF EXHIBITS.

By Miss O. B. Davis, M.Sc.—Specimen of *Loranthus celastroides*, Sieber, Common Mistletoe, growing on *Quercus robur*, British Oak, collected at Brighton.

By Mr. C. J. Gabriel.—Marine shells: Victorian representatives of the genus *Conus*—*C. anemone*, Lam., and a series of the white variety; *C. rutilus*, Menke; *C. segravei*, Gatliff; and Cones from tropical waters, including *C. textile*, Linn., Queensland; *C. nussatella*, Linn., Queensland; *C. capitaneus*, Linn., Queensland; *C. vexillum*, Mart., Mauritius; *C. betulinus*, Linn., Mauritius; and *C. generalis*, Linn., Mauritius.

By Mr. J. G. O'Donoghue.—Photographs of Lake Mournpoul, in illustration of his paper.

By Mr. F. Pitcher.—Blooms of *Acacia Maidenii*, F. v. M., Maiden's Acacia, and *Acacia retinodes*, Schlech., Bald Acacia, now flowering in the Melbourne Botanic Gardens.

By Mr. J. Searle.—Thrips off geranium flower.

By Mr. J. R. Tovey.—Specimen of Common Mistletoe, *Loranthus celastroides*, Sieber, growing on *Schinus molle*, Pepper-tree, collected in exhibitor's garden at Mentone, February, 1915.

After the usual conversazione the meeting terminated.

OMISSION.—In the report of the January meeting in last *Naturalist* mention should have been made of the presence at the meeting of Dr. W. Macgillivray, of Broken Hill, a country member of the Club, and a former office-bearer. He was cordially welcomed by the president, and briefly responded.

EXCURSION TO WARBURTON.

THE Foundation Day outing to Warburton was this year undertaken by a small but enthusiastic party. The excursion extended from Saturday morning, 30th January, to Monday afternoon, 1st February. All the plants recorded in former trips over the same routes were observed, but, of course, those seen in bloom when the fixture was earlier in the year were seen out of flower only. Saturday morning was spent in walks along the banks of the Yarra River, in close proximity to the township, where nearly all the shrubs of the district may be observed. The Mutton-wood, *Myrsine variabilis*, was well in fruit, in some instances remarkably so, one large shrub being almost covered with the round, bead-like, violet-coloured berries. *Lomatia longifolia* was covered with its peculiar protean pods, in various degrees of ripeness. The Banyalla, *Pittosporum bicolor*, and Austral Mulberry, *Hedycarya Cunninghamii*, were also in fruit. Growing close to the water's edge are several fine specimens of the Golden Shaggy Pea, *Oxylobium ellipticum*. In the afternoon we went up Scotchman's and Backstairs Creeks to Old Warburton, an outing whose beauties and flora are so well described in the *Victorian Naturalist*, vol. xxi., p. 139. Here we saw fine growths of the ferns *Polypodium punctatum*, *Pteris tremula*, *Asplenium umbrosum*, &c. The return journey was made along the driving track which leads out at La La. Along this road is very fine scenery, and a fern gully quite equal in beauty to that at the head of Backstairs Creek, near Old Warburton, and close to La La there is a fine patch of the Hickory Wattle, *Acacia penninervis*. The other acacias seen along the route were *A. myrtifolia*, *A. verticillata*, *A. linearis*, *A. dealbata*, and *A. melanoxyton*. The eucalypts met with were *E. obliqua*, *E. goniocalyx*, *E. viminalis*, *E. Gunnii*, *E. amygdalina*, and *E. Sieberiana*. The outing on Sunday was to Cement Creek, about six miles on the new driving track to Mount Donna Buang. At the creek the road, which has attained an altitude of about 2,200 feet above sea-level, doubles back in seeking an easy gradient, and a wide space is provided for vehicles to turn. Continuing on from here also is the bridle track to Marysville. At Cement Creek and at a creek a mile or so further back are some very fine Myrtle Beeches, Sassafras, and other denizens of the higher mountain gullies. So enamoured were we with the beauty all along the road that we decided to continue further, and eventually to try to reach the summit of Donna Buang. For a considerable distance the forest presents similar delights, and provided ample subjects for observation and discussion during the after-luncheon stroll. We passed through glades of magnificent trees and shrubs, between glorious mossy banks, and in places many bushes of *Eriostemon Hildebrandi* (*Phebalium bilobum*), which

doubtless made a fine floral display earlier in the season. I have to confess that, owing to the approach of night, we were unable to reach the actual summit of the mount, but went a little beyond the fountain built by the Public Works Department on the road at a clear space which affords a fine view over the country lying between Donna Buang and the Dandenong Ranges, and over which we a little later saw the sun set. Before reaching this point we had splendid views over Warburton and Big Pat's Creek, and as far as the Baw Baws. The principal plants in flower along the road were the Forest Senecio, *Senecio velleyoides*, and the River Mint, *Mentha australis*, the latter in patches, the former in general abundance. The return journey was made down the steep foot-track, said to be about $2\frac{1}{2}$ miles, but which seemed considerably more to one who had walked all day. The hotel was reached about 9 o'clock. Nothing finer could be desired than the flora and scenery through which we passed that day, and it is perhaps best to refrain from gush, and simply say that it is so good that no nature-lover should miss it. Monday morning was spent in a drive to Big Pat's Creek, and an hour's stroll when there. *Leptospermum scoparium* was in flower, attracting a few beetles and other insects, while the beautiful saplings of the Silver-top Gum, *Eucalyptus Sieberiana*, were themselves worthy of the trip. In the afternoon some of the party made a further excursion up Scotchman's Creek before leaving for the city by the 5.30 train. In the township we noticed, grown in pots, some fine specimens of the Mountain Club-Moss, *Lycopodium densum*, which had been obtained from near the O'Shannassy Weir, about 13 miles distant. During the excursion special attention was paid to thrips, of which several species probably new were collected; but these have to be submitted to an English authority.—R. KELLY.

DAPHNIA CARINATA, King.—In a reprint of a paper by Prof. G. O. Sars, published in *Archiv for Mathematik og Naturvidenskab*, B. xxiv., nr. 1 (Kristiania, 1914), the author describes the typical form of *Daphnia carinata*, first described in the Proceedings of the Royal Society of Van Diemen's Land (now Tasmania) in 1853, and no less than seven varieties. We notice that the late Mr. O. A. Sayce, A.L.S., and Mr. J. Searle have been responsible for sending several of these interesting forms to Professor Sars. Thus, var. *intermedia* was obtained by Mr. Sayce at St. Arnaud; var. *gravis* by Mr. Searle at Kardinia Creek; var. *eurycephala* (n.v.) by Mr. Searle at Fairfield; var. *expansa* (n.v.) by Mr. Sayce at Cheltenham, and a closely allied form by Mr. Searle at Fairfield; while vars. *cephalata* and *lamellata* were obtained by Mr. Searle in one gathering at Heidelberg.

ON THE SPECIFIC NAME OF THE BLOOD-STAINED COCKATOO, *CACATUA SANGUINEA*, GLD.

BY G. A. KEARTLAND.

(Read before the Field Naturalists' Club of Victoria, 14th Dec., 1914.)

WHILST some ornithologists have spent much time and care in the study of our avifauna in order to avoid the unnecessary and erroneous multiplication of species, others have gone to the opposite extreme, and, where a slight change in plumage has occurred, have at once proclaimed a new species, without pausing to see whether the variation was sustained.

Take, for instance, Gould's Finch, *Poephila mirabilis*. Some have black heads, whilst in others the head is scarlet or yellow. These have been recently separated into three species, although they may all be seen mingled in one flock, and have been bred together in captivity. In one case within my own knowledge a pair of black-headed birds produced four young ones, two of which had scarlet heads when they were about six months old and had acquired their mature plumage, whilst the other pair resembled their parents. It is with a view of checking this confusion that I am writing these lines.

In consequence of the division of the Blood-stained Cockatoo, *Cacatua sanguinea*, Gould, into two species by Dr. Sclater—the second under the name of *C. gymnoptis*—several ornithologists have followed suit. This appears to be the result of working from insufficient material, as the main points relied on for the separation are the bare skin round the eye and a slight variation in size. In Hall's "Key to the Birds of Australia and Tasmania" *C. sanguinea* is described as having the naked skin round the eye *white* and nearly circular, whilst *C. gymnoptis* is said to have the bare skin *blue* and largely extending into an open space below. This species is also said to be slightly larger than the foregoing. The measurements given are:—*C. sanguinea*—total length 14 inches, wing 10 inches; *C. gymnoptis*—length 16 inches, wing 11 inches. The vernacular name of "Bare-eyed Cockatoo" is even more confusing, as it applies with equal force to at least four species—viz., Long-billed Cockatoo (Corella), *Licmetis nasica*, Western Long-billed Cockatoo, *L. pastinator*, Sulphur-crested Cockatoo, *Cacatua galerita*, and the Blood-stained Cockatoo, *C. sanguinea*, all of which have bare skin round the eye.

In "Nests and Eggs of Birds Found Breeding in Australia and Tasmania," Mr. North states that he has examined thousands of living birds and skins of this species from various parts of Australia without finding one with the white skin round the eye, but that in every case it was bluish-grey. However, he quotes a field note from Dr. W. Macgillivray, of Broken Hill, in which that gentleman states that he has seen

a few old birds with the white skin. Gould based his name on a few dried specimens, and, of course, the skin would be dark in that case. Although he is silent on the colour of the skin in his "Handbook," he shows it as white in the coloured plates of his larger work. Dr. Sclater described *C. gymnopis* from a living bird, giving its habitat as South Australia. He also examined a number of skins of this species obtained by the late Captain Charles Sturt, and refers them to *C. gymnopis*.

In view of these varied opinions, I now place my experience of these birds before the members of the Field Naturalists' Club. Whilst on a visit to Adelaide, in 1892, I purchased a pair of Blood-stained Cockatoos from a dealer, who had over fifty of them in his cages, all of which had the blue skin round the eye. Some of the birds were larger than others. The skin of the largest of those I bought is now in the Melbourne Museum; the other died whilst I was away from home. In 1900 I saw a bird-catcher at Spencer-street station with about 150 young birds, which he had brought from Broken Hill. I secured four of them—two for myself and two for friends. One of those I kept had white skin on its face, although too young to feed itself. In the others it was blue. I gave the one with the white skin to my daughter on her removal to Beechworth about thirteen years ago, and last October she returned it to me. I am exhibiting it to-night, alive and in good health, and it will be noticed that, instead of the face being white, it has now changed to blue. Another point worthy of note is that the fluff on the base of the feathers of the young birds is red, but becomes paler as the birds get older.

During the stay at the junction of the Fitzroy and Margaret Rivers, in North-West Australia, of the Calvert Exploring Expedition (January, 1897), I saw thousands of Blood-stained Cockatoos, many of which were shot for the cook. One evening four large trees near our camp were white with these birds, as if covered with a mantle of snow. When they rose from the trees on my approach I fired two shots into the flock and brought down ten birds, some of which were larger than others, and two had white skin round the eyes, but in all the rest it was blue. Now, if this is not conclusive evidence in support of the one species theory, I will be glad to learn from those who differ from me where the birds with the white skin on their faces may be found in flocks without the intrusion of *C. gymnopis*.

Of course, it is well known that in some instances birds of one species may be seen mingling in a flock of another, but that is not at breeding time. For instance, I have shot a solitary Black Duck, *Anas superciliosa*, out of a flock of Teal, *Nettion gibberifrons*. For several days a Radjah Shielddrake, *Tadorna radjah*, remained on a swamp near our camp in a

flock of Black Duck, and, although they were frequently disturbed, the white bird always kept with them. When the eucalypts are in blossom it often occurs that a flock of Musk Lorikeets, *Trichoglossus concinnus*, and Little Lorikeets, *T. pusillus*, are seen travelling together or feeding on the same tree. At the Fitzroy River, North-West Australia, nearly every flock of Red-kneed Dottrel, *Erythrogonys cinctus*, which I saw running or flying on the swamps had a wader of some other species in its company—sometimes a Greenshank or Little Sandpiper. But we know that all the birds named in this paragraph form communities of their own at breeding time.

Now, I am in a difficulty to determine which species my bird belongs to—*Cacatua sanguinea* or *C. gymnoptis*, or whether I shall call it *C. gymnoptis*, late *sanguinea*. There he is—judge for yourselves.

NOTE ON THE OCURRENCE OF MONSTRILLIDÆ IN VICTORIA.—In the material collected with the tow-net at Beaumaris excursion, 12th December, were found two specimens of a species of *Monstrilla*, a semi-parasitic copepod with a remarkable life-history. Hatched as an oval nauplius with three pairs of appendages but no alimentary canal, it soon seeks out a Serpulid worm, and, clinging to it with its hooked mandibles, it pierces the epidermis of the worm by the aid of its antennæ and works its way into its body. During the burrowing process the limbs are lost, and the nauplius degenerates into an ovoid mass of cells surrounded by a chitinous envelope. By amoeboidal movement it finds its way into the blood-vessels, and finally comes to rest in the ventral blood cavity of the worm. It now begins to grow. At first a pair of fleshy appendages are formed (which are really modified second antennæ), by the aid of which the parasite obtains nutriment from its host. From the undifferentiated mass of cells the various appendages of the adult are differentiated inside the chitinous envelope. When fully developed it ruptures the body wall of its host and escapes into the sea, leaving behind the second antennæ, which have served their purpose. In the adult animal the mouth parts are entirely absent, the only cephalic appendages being the first antennæ. It possesses a tiny mouth opening into a minute stomach, from which there is no other opening, the rest of the body cavity being taken up by the very large ovary. Its thoracic feet are well developed, and it swims about rapidly while the process of reproduction is carried out. The family *Monstrillidae* contains three genera and some sixteen species. Owing to want of time for examination, I have not yet determined whether my specimens are referable to any known species. I think this is the first record of the family *Monstrillidae* being found in Australia.—J. SEARLE.

A NATURALIST IN NORTHERN QUEENSLAND.
BY J. A. KERSHAW, F.E.S., Curator of the National Museum,
Melbourne.

(Read before the Field Naturalists' Club of Victoria, 9th Nov., 1914.)
(Continued from page 124.)

Each day excursions in various directions from the camp were made, involving long and often wearying tramps, but always full of interest. At times our wanderings took us through long stretches of open gum forest to distant patches of scrub, but more often we rowed up or down the river in our dingey, and, selecting a suitable landing-place, would pass the day exploring the jungle or open flats along its borders.

The river trips, though usually short, were especially enjoyable. Winding about through a dense mass of tall trees, shrubs, and palms, their branches dipping into the stream on either side, and frequently thickly covered with creepers of various kinds, we could observe the brightly-coloured butterflies and birds as they flew over the river and among the trees. The effect of light and shade on the water, the varied tints of the foliage, and the pretty hibiscus-like flowers of an overhanging tree which, constantly dropping into the stream, drifted with the tide, made a pretty picture, and one could never tire of admiring its ever-changing beauty. Birds were always plentiful here, especially in the early morning and towards sundown. The little Masked Gerygone, *G. lavigaster*, was commonly seen adding material to its long, ragged-looking nest suspended just above the water, while an occasional Purple Kingfisher darted silently up or down the river. Orioles, Starlings, Drongo Shrikes, Quoy's Butcher-birds, Flycatchers, Honey-eaters, and many other birds occupied the trees along the river-banks, while now and then the noisy Red-sided Parrots, Great Palm and Sulphur-crested Cockatoos flew screaming overhead. At a sheltered bend of the river, covered with water-lilies in full bloom, a flock of the black and white Pied Geese was discovered perching in the tree-tops, while lower down stream, among the mangrove swamps, large groups of the Yellow-legged Spoonbill were occasionally disturbed. There was always something fresh to be seen on the river, especially when, later on, the rainy season brought the trees and shrubs into flower.

On the 9th of November we decided to establish a temporary camp some seven or eight miles further up the river, our object being the investigation of the river scrubs and forests further inland, in the hope that new animals might be met with. We left early in the afternoon, and, as we had, of course, to carry our provisions and general camp outfit as well as our guns and

collecting material, we were each well loaded. The day was very hot, and the ground cracked and hard owing to the want of rain, and, though our course was fairly level, we were glad of an occasional spell. We passed through open forest, with occasional narrow belts of thick scrub, which border a number of small creeks, now dry, but full of water in the rainy season. Enclosed within these belts of scrub are broad flats, usually overgrown with tall, rank grass, in places up to four feet high, with numerous tall termites' mounds scattered about. Small creeks which cross the flats are nearly always indicated by belts of Screw Palms, *Pandanus*. In the thick scrub were many beautiful fan and other palms, fig-trees, and tall bamboo thickets, forming a dense tangle very difficult to penetrate. On the journey, in a somewhat sheltered part of the forest, we suddenly came upon numbers of butterflies flying about, chiefly *Danaida archippus*, *D. petilia*, *D. affinis*, and the black and white *Euplecta sylvester*. Our packs were immediately dropped, the heat and weariness forgotten, while we rushed here and there, busy with our butterfly nets. Curiously enough, although these butterflies were so plentiful in this small area, we did not meet with them elsewhere on this journey. About a week later, however, we came upon a similar but much larger flight, some eight or ten miles further south. These consisted chiefly of *Euplecta sylvester*, hundreds of which were flying about, while dozens could be seen resting on a single dead tree, several specimens being taken with one sweep of the net. In this case it was thought that their sudden appearance in such large numbers was due to the fact that a few showers of rain had fallen on the previous day.

We reached our destination before dark, and pitched our tent on the bank of the river on the margin of the dense scrub. Here we had a plentiful supply of good water, and could bathe safely in a shallow pool. During the evening we saw a pair of the Large-tailed Nightjar, *Caprimulgus macrurus*, flying over the camp, and heard its peculiar "Chop chop" note, and through the night were occasionally startled by the loud, gruff bark of the crocodiles close by. There was a good crossing here, as the river was very low, forming a series of water-holes connected by narrow channels, with here and there broad patches of sand. The whole is covered in by the tall trees, giving a beautiful and very welcome shade. On either side of the river was the usual tangled jungle of tropical vegetation, into which, without an experienced guide, one dare not penetrate, and I often envied Mr. M'Lennan's ability to guide us safely back to camp. Outside the scrub are extensive grassy plains, with scattered patches of *Pandanus* and wooded hills. We explored these so far as our time permitted, taking

many species of moths, dragon-flies, cicadas, diptera, and other insects along the margin of the scrubs. On the tree-trunks were captured several species of Cicindelids—remarkably quick-running beetles, which darted round and round the tree-trunks so quickly as to puzzle one. The largest of these was *Tricondyla aptera*, Oliv., a species not uncommon in New Guinea.

The great Carpenter Bee, *Xylocopa bryorum*, widely distributed throughout Queensland and the Northern Territory, was commonly met with. It is about one inch in length, the thorax clothed with golden-yellow hairs. It breeds both in the trunks of the larger trees in the forest and in small saplings in the scrub. A circular hole is bored into the wood and continued downwards for about four inches. This round chamber is divided off into a row of cells, in each of which is deposited a small ball of sweet-tasting bee-bread, together with an egg. The larva, on hatching, feeds on the bee-bread, and finally changes into the pupa and then the perfect insect within the cell. Several which were opened contained not only the perfect insects, but the pupæ and larvæ. Another bee, a very small species, belonging to the genus *Trigona*, makes its home in small cavities in the bases of the trunks of large eucalypts or in logs, and the combs are known to the blacks as "honey-bags." The irregular, dark brown combs contain, usually, about a pint of dark-coloured honey, which is greatly relished by the blacks. A hive discovered in a log was opened up, and found to contain a good quantity of honey, which our blackboys scooped out in handfuls, filling their mouths with a dirty, sticky mass of comb, honey, and bees. Some of this honey was carefully extracted and taken to our camp. It has a peculiar, rather acid flavour, which, in the absence of nothing better, might be appreciated.

The scrub was simply alive with birds, one of the most numerous being the Nutmeg-Pigeon, their continuous, monotonous cooing while feeding high up in the topmost boughs of the great fig-trees being a common feature of the scrub. Other pigeons met with include the Purple-crowned Fruit-Pigeon, *Lamprotoreron superba*, the Rose-crowned Fruit-Pigeon, *Ptilinopus ewingi*, the Allied Fruit-Pigeon, *Megaloprepia assimilis*, the Little Green Pigeon, *Chalcophaps chrysochlora*, the Barred-shouldered Dove, *Geopelia humeralis*, the Little Ground-Dove, *Geopelia tranquilla*, and the Pheasant-tailed Pigeon, *Macropygia phasianella*. Throughout our stay in this country our meals were, to some extent, composed of these birds, varied with Scrub-fowl, Scrub-Turkey, Cassowary, Pied Goose, &c., all of which proved good eating, and, with our damper, were always relished after our long rambles. Rifle-birds, *Ptilorhis alberti*, were fairly numerous, but difficult to

detect in the semi-darkened scrub. We occasionally saw them flying silently through the trees, and more often heard their characteristic call. Several nests were found, sometimes low down in a small sapling or vine, others high up in the branches. Most of these contained two eggs, and one a partly-fledged young one. Starlings and Blue Mountain Parrots were everywhere, the Red-sided Parrots, *Eclectus pectoralis macgillivrayi*, usually frequenting the larger fig-trees in company with Sulphur-crested Cockatoos and Starlings. Mr. M'Lennan climbed several trees for the eggs of the Red-sided Parrot, and also visited the nests of the Grey Goshawk, built in the same trees, in one of the latter finding eggs. He had perilous climbs—in one instance to 93 feet, the lowest bough being 60 feet from the ground, the last 30 feet being reached by cutting niches in the smooth-barked tree just large enough to obtain a hold for his big toe. The brilliantly-coloured Purple Kingfisher, *Alcyone pulchra*, was often seen along the river, while the Lesser Brown Kingfisher, *Dacelo gigas*, var. *minor*, a small variety of our southern Laughing Jackass, as well as Leach's and Macleay's Kingfishers, all breed in termites' nests in the trees of the open country. The rare Rufous Owl, *Ninox rufa*, was flushed from a clump of bamboos—a favourite camping-place also for the Papuan Podargus.

Emerging quietly from the scrub on the river, we suddenly came on a full-grown Cassowary bathing and preening its feathers in the shallow water. We had frequently seen traces of these birds, which are apparently plentiful in the scrubs, and occasionally heard their deep drumming note, but this was the first we had seen.

Quite a number of butterflies were taken, including further specimens of the new Lycænid, *Pepliophorus amphissa claudia*, *Tellervo zoilus*, *Elodina angulipennis*, *E. perdita*, and *Melanitis leda*, the latter being common, but difficult to capture, owing to its habit of settling among the dead leaves, which it so closely resembles. Several specimens of the brilliantly blue *Papilio joesa* were seen flying down the river, and a few rare moths taken, including *Tigridoptera mariana*, *Euschemon mars*, *Hypsa basilissa*, *H. dama*, and others.

The Kapok Tree, *Bombax malabaricum*, grows here, their presence being usually indicated by the numbers of dry, dark brown pods on the ground, where they had burst open, exposing the silky-white down. Another tree was remarkable from the fact that its seeds, attached to long, slender stalks in bunches, were covered with a strong, sticky substance resembling bird-lime. When ripe they fall to the ground and stick to anything they come in contact with. We often had bunches of them stuck to our boots and clothes, while Dr.

Macgillivray found the tail feathers of a Lovely Wren, *Malurus amabilis*, adhering to a bunch still attached to the tree. A small dog which occasionally accompanied us had great trouble with them. When they stuck to his feet he sat down and attempted to remove them, only to get more on his head and back, and his excited efforts only made matters worse, until he finally gave up in despair. The well-known Queensland Black Bean, *Castanospermum australe*, grows generally on the outskirts of the scrub, climbing to the topmost branches of the tall trees. A Fig-tree, *Ficus glomerata*, was remarkable for its great clusters of fruit attached close to the trunk. Several other trees were also noticed bearing fairly large fruit, which, however, was often very bitter and apparently inedible. On one of these trees was found a quantity of fleshy fruit of a red colour, with the stone outside, reminding me of the Native Cherry, *Exocarpus*. The fleshy part, which had a fairly pleasant taste, was about $1\frac{1}{2}$ inches wide, and the stone, of a compressed oval shape, about 1 inch wide. On returning to camp these were submitted to our blackboys, who stated that the fleshy part was "no good," but the kernel, after being baked in the hot ashes of the fire, was "good." This they illustrated by eating the kernel, after being baked, but we found it very tasteless. Dr. Macgillivray was fortunate enough to find a very fine Hoya in flower—the only one seen during our visit. The corolla was saucer-shaped, $2\frac{1}{2}$ inches in diameter, the segments broad, pale lavender in colour, with the tips and edges darker. The corona is of a beautiful purple. On being submitted to Mr. F. M. Bailey, Government Botanist of Queensland, on our return, it proved to be a new species, which he has since named after its discoverer. Among other plants found and since determined by Mr. Bailey were a spotted orchid, *Dipodium punctatum*, var. *Hamiltonianum*, plentiful along the margin of the scrub: a lily, *Crinum*, ? sp., probably new, common in swampy situations in open forest; two species of ferns—viz., *Cheilanthes tenuifolia*, very plentiful in open country, both on mainland and on Lloyd Island, and *Aspidium cordifolium*, found along the margin of tea-tree swamps; *Gardenia Kershawi*, n. sp., common along margin of scrubs; and *Curcuma australasica*. The latter was commonly found in sheltered situations along the margins of the scrub and on Lloyd Island. The flower appears first, growing to a height of about nine or ten inches, followed by the broad, green, elongate leaves.

Mammals were very scarce. A few kangaroos and wallabies were occasionally seen, and two of the latter shot. Bandicoots were not uncommon, and we often heard them during the night running among the dead leaves near our camp. The blacks

were remarkably quick to detect their tracks in the thick matted grass, which they would quickly follow up and suddenly jump with both feet on to a tussock, rarely failing to secure the animal, although to us there was nothing to indicate its presence. On one occasion one of our blackboys started chopping at the base of a large gum-tree. On inquiring what he was after, he said, "Him feller, nails on him back," which we soon found was not a bad description of the Echidna, or Porcupine Ant-eater. At another camp some pack-saddles were packed close together near our tent. One of the blacks started removing them, but suddenly stopped, and, securing a three-pronged spear, thrust it between them. This was followed by a sharp squealing, and we found he had speared a small native cat, *Dasyurus*. Flying-foxes were plentiful in the dense scrub, where they were often seen in great numbers, hanging head downwards from the branches of some tall tree. A small rat, *Mus*, ? sp., was found in its nest of dry grass in a dead stump about six feet from the ground, and another captured in our tent. The Spotted Cuscus, or Phalanger, *Phalanger maculatus*, inhabits the scrubs, but was apparently far from common. We found only two specimens, about half grown, one of which was sleeping, coiled up on a branch in the scrub. The Dingo occurs here, and, according to the blacks, is fairly numerous; but, though we did not see any, their tracks were occasionally met with.

I quite expected we should find snakes very numerous on the mainland, but was disappointed. We saw very few, and only about half a dozen species, the Carpet Snake being the most common. The largest of these was eleven feet long, and, when discovered, had just swallowed a half-grown wallaby. Another, about eight feet long, was lying stretched out full length on a fallen log, and was very quiet. It was pulled off the log by its tail, and coiled on to my net handle, but made no attempt to strike. Another species was discovered in our tent. We were busy, late one night, working in the bed of the creek, finishing off some skins, when Mr. M'Lennan decided to turn in. The night was dark, and I was using our only lantern. We were suddenly startled by a shout and excited call for a light, and then a shot, and, hurrying to the tent, we found a snake a little over four feet long, which had coiled itself on his pillow. Fortunately, he had struck a match to search for some missing article before lying down. It proved, however, to be a non-poisonous species, but we were more careful to search our grass beds in the future. Although the Death Adder was said to be very numerous, we only secured one specimen, and this on Lloyd Island. A tree snake and two or three other species were also captured. Lace Lizards, *Varanus*, were fairly

common, and were often disturbed while passing through the open forest. A number of smaller lizards, including the Blue-tongue, *Cyclodus*, were also secured, while the only Frilled Lizard seen was obtained from a party of blacks who happened to pass our camp. The blacks are very frightened of snakes, and could not be induced to touch even a disabled specimen, but they will not hesitate to spear them. Under logs and débris in the scrub a number of large land snails, *Helix*, were found, and several species of beetles were obtained by splitting open decaying logs, but these were far from being plentiful.

On the 12th November we packed up our swags and returned to the main camp. On our way we took several more butterflies, and, entering a patch of scrub, discovered another colony of the large Fruit Bats, and in the open forest took three eggs of the Lesser Brown Kingfisher from a white ants' nest. The weather was excessively hot, and the whole country parched, making our seven or eight miles' tramp back to our main camp, with our heavy swags, one of the most trying we experienced during our visit. We visited the same locality about a week later, when we made many interesting additions to our collections. Further nests of the large Red-sided Parrot, *Eclectus*, and the Rifle-bird were found. A Long-tailed Nightjar was flushed off its two eggs deposited on the bare ground near the edge of the scrub, and the nest of the Lovely Wren, *Malurus amabilis*, discovered in the scrub. The King and the Red-backed Quail, *Turnix melanota*, were frequently flushed from the grass flats, and other birds noted include the Spotted Cat-bird, *Ailuroedus maculosus*, White-faced Robin, *Pachycephala albifasciata*, Shining Flycatcher, *Piezorhynchus nitidus*, Grass-Warbler, *Cisticola exilis*, and many others. Another new butterfly, *Hypocista aroa angustata*, brown, with a broad white band across both wings, was taken, also the beautiful white *Mynes geoffroyi* and *Cethosia cydippe*, all strictly tropical species.

Each day long excursions were taken up or down the river to different parts of the scrubs, or through the open country, and each trip brought new experiences and adventures. At times, when passing quietly through the timber, we would be suddenly startled by a peculiar, plaintive, croaking cry close beside us. This, on investigation, was found to be made by a small Gecko lizard, about 7 or 8 inches long, known as the "Crying Lizard," which occupies narrow hollows in the trunks or branches of the trees, indicated by a small entrance hole. A somewhat similar cry is made by a large green frog, *Hyla caerulea*, which is also found in similar cavities in the tree-trunks. Occasionally a small iguana, *Varanus*, was found occupying the same cavity. We had little time for fishing in

the river, but managed to spear a few mullet and a Spotted Butter-fish, *Ephippus argus*. Numbers of small garfish and another small species resembling the Rifle-fish frequented the river, while a fair-sized Stingray was seen above our camp.

As our stores were running very low, we left on 26th November for Lloyd Island, walking across country some eight or nine miles to the coast opposite the island, which is about a mile from the shore. All along the coast here is a thick belt of mangrove and a fairly broad sandy beach, on which, at low tide, are great armies of a small Soldier Crab. There were very few shells, and most of these were bleached and worn, but in the shallow water we found numbers of the flat Sea Urchin, *Arachnoides placenta*, Linn., which buries itself under a thin layer of sand. In the deeper water were also taken several starfish.

The recognized method adopted by the blacks of reaching the island from here is to make a "smoke," when a boat would be sent across. We made a "smoke" and fired our guns, but had to wait for a couple of hours for the boat. We noticed that three or four of the *beche-de-mer* boats had recently arrived, and soon learnt that the blacks had been celebrating the event, hence our long delay. Getting our stores aboard a small cutter, we started late in the afternoon for the Claudie River. While passing Lloyd Island we had a splendid opportunity of witnessing the wonderful flights of the Nutmeg-Pigeons, Blue Mountain Parrots, and Glossy Starlings. Thousands upon thousands of these birds flew across from the mainland in continuous streams, filling the air with their cries. While the Pigeons fly low down, usually close to the water, in twos or threes or in small flocks, the Parrots fly high and very swiftly, uttering their cries continuously. The most interesting sight of all, however, is the extraordinary flights of the Starlings. These could be seen far away over the mainland, rising above the trees in small flocks, which gradually unite, until they form several enormous, compact, black masses. Flying in great circles, they are seen to suddenly drop low down, rising again in a long spiral column, in the distance appearing like a column of black smoke. Re-forming into a compact mass, then breaking up and spreading out, only to come together again, they gradually rise higher and higher, ever sweeping and circling, yet always together, sometimes almost invisible in the sky, then, as the light catches their shining black backs, showing out with inky blackness. When they approach the island they suddenly swoop down close to the water, over which they skim with lightning speed, a whirling, noisy mass, into the mangroves. Once seen, this sight is not likely to be forgotten.

Soon after entering the river darkness came on, and, as the tide was running out, our progress became so slow that we decided to go on in the dingey, and land two or three miles below our camp. After a long and weary pull, during which two or three crocodiles splashed close to our boat, we got ashore about midnight, and started at once for our camp. The night was very dark, and, after scrambling about through the scrub and getting a fair supply of green ants over us, and stumbling over logs for about half an hour, we had to confess that we were hopelessly bushed, and decided to camp where we were until daylight. Lying on the ground and tormented with myriads of starving mosquitos, we waited for daylight, for sleep was out of the question. With the first streak of dawn we were off again, and, after a long tramp, reached camp about 8 o'clock, tired and hungry, having fasted since 3 o'clock on the previous day. A bath and a meal, however, soon freshened us up, and, packing our baggage off down the river, we walked back to where we had left the cutter, and started off again for Lloyd Island, and thence on the lugger *Keith* for a long trip to Raine Island, situated outside the Barrier Reef, north-east of Cape Grenville. This trip occupied three weeks, during which we visited a number of islands both within and outside the Great Barrier. We reached Lloyd Island again on our return late at night on the 17th December.

The next morning we again had an excellent opportunity of witnessing the great flights of Pigeons, Starlings, and Parrots, but this time leaving the island for their feeding-grounds on the mainland. The Parrots are always the first to leave, then the Starlings, followed by the Pigeons. One mass of Starlings must have included some thousands of birds, and their extraordinary habit, already described, of bunching up into great black masses and then drawing out into long, sinuous lines and circling to and fro, was again repeated.

Transferring our belongings to a cutter, the *Leichard*, we left again for the Claudio River camp. The cutter could only run up the river a short distance, as the tall mangroves on either bank shut out what little wind there was, so we had to pack our baggage into two dingeys manned by two blackboys and row all the distance to our camp landing. Among the birds seen while passing up the river were White Ibis, Black-and-White Cormorant, Little Whimbrel, Common Sandpiper, Red-shouldered Parrot, Scrub-Fowl, Palm Cockatoo, Bee-eaters, &c. We were soon settled down again, and resumed our excursions in the scrub and forest. The rainy season set in just before Christmas, and after the first few days scarcely a day passed without one or more violent tropical downpours, accompanied with deafening thunder and vivid lightning. At times these

storms raged so fiercely that we fully expected to have our tents blown away; as it was, trees were uprooted and boughs scattered all around us. Great trees in the scrub were blown down, and in their fall tore down great masses of creepers and vines and several of the adjacent smaller trees, making great gaps in the forest. The whole atmosphere was saturated with moisture day and night, and we had the greatest difficulty in preserving our specimens from mildew. These, with our other belongings, had to be repeatedly unpacked, and, when the sun appeared, dried and repacked. Thick growths of mildew covered our bags, boots, and clothes stored in a water-tight tent, and our everyday clothes and boots were rarely dry. Myriads of mosquitoes appeared, and these, with three or four species of March flies, *Tabanidae*, which accompanied us constantly in hundreds, tormented us night and day. The heavy rains filled the dry creeks and swamps, and caused the river to rise seven or eight feet, making it impossible to use our dingey for some time. They, however, did not prevent our daily excursions, and we added considerably to our collections.

Among the birds which we now saw frequently were the White-tailed Kingfisher, Yellow-billed Kingfisher, *Syma flavirostris*, Blue-breasted and Lesser Pittas, *Pitta mackloti* and *P. sinillima*, White-browed Robin, *Pachycephala superciliosa*, White-bellied Flycatcher, *Monarcha albiventer*, Pearly Flycatcher, *M. canescens*, Spotted Cat-bird, *Ailuroedus maculosus*, and many others, the eggs of all of which were found. Every night we heard the calls of the Red-necked Rail, *Rallina tricolor*, the first of which we noticed on 22nd December, and were probably the earliest arrivals from New Guinea. Many additional insects were also collected, and it was noticeable that these were becoming much more numerous since the rains had started. Beetles not seen before now appeared, and, among these, the brilliantly-coloured Cetonids, *Lomaptera yorkiana*, *L. australis*, and *L. macrostica*, which frequented the tops of flowering shrubs and trees, at times in great numbers, their presence usually being detected by the humming of their wings. At the camp we were constantly being annoyed by great numbers of a rather small carrion-feeding beetle, *Phaechrous hirtipes*, MacL., which were attracted by the light of our camp. Every night hundreds of these beetles flew around, dropping down our necks and into our food, and even our beds were invaded. If a recently emptied jam tin was left about it would be quite full of the beetles in the morning. Bodies of birds thrown out after skinning would be completely covered by thousands of these beetles in about ten minutes, and within an hour or so bodies the size of a Thrush or Laughing Jackass would be entirely denuded of

every particle of flesh, leaving the completely cleaned skeleton. In fact, we made use of these scavengers, and secured several perfect skeletons in this manner. It was impossible to leave a bird or mammal exposed even for a few minutes, otherwise it would be rendered useless as a specimen, and even while actually skinning the bird we had to keep removing these creatures. Not far from our camp I found the same species, clustered together in one great mass of some hundreds, sheltering in a slight depression on the trunk of a gum-tree. A burying beetle, *Onthophagus laminatus*, MacL., was also very numerous, and was similarly attracted by the light. In a pit we had made for camp refuse they were observed during the daytime forming round balls of earth and decaying matter, about half an inch in diameter, in which they deposit their eggs, and rolling them away for burying in the surrounding soil. Sometimes they would push them along by their head or forelegs, at others they rolled them behind them, using their hind feet.

The weather was now exceedingly hot and muggy, the perspiration running off us with the least exertion, and keeping our clothes constantly wet through. My body, legs, and feet were covered with a large red rash, making the soles of my feet exceedingly tender and painful, and our shoulders, arms, legs, and ankles were badly blistered, chiefly through the bites of mosquitoes. Although the latter were bad enough, a small biting *Tabanus* fly had recently appeared which was even more troublesome. No sooner did this fly settle than it began operations. They covered our clothes in dozens, settling on our necks, faces, and hands—even getting under our coats—and it was quite impossible to keep still for a moment. To make matters worse, we had a great swarm of termites, myriads of these winged creatures entering our tents and covering everything. While engaged in skinning some birds they dropped into the arsenic, plaster of paris, all over the bird, in my hair, and down my back, until they nearly drove me distracted. As they settled they immediately cast their wings, which, on the following morning, covered everything on the table.

Almost every day we had a violent thunderstorm, accompanied by vivid lightning, sometimes up to two inches of rain falling in a short time. To the 1st January over 13 inches had been registered. During these storms the interior of the scrub became so dark that it was almost impossible to continue our searches. We had arranged to leave here early in January on our homeward trip, but the flooded state of the river, which was now overflowing its banks in many places, rendered it unsafe to launch our boat, while it was impossible for any boat to come up the river. We therefore continued our work on the mainland, and, notwithstanding the heavy rains, made

many interesting discoveries. On a hill not far from our camp was observed a round hole about $1\frac{1}{2}$ inches in diameter and lined with web. This we dug out, and, at the end of the burrow, discovered what has since been found to be the largest known Australian spider.* *Selenotypus plumipes*. Pocock. It measured over 5 inches from tip of forelegs to tip of hind legs, $2\frac{1}{2}$ inches from front of head to end of abdomen, and $\frac{5}{8}$ inch across the thorax. The legs were thickly haired, abdomen smooth and velvety, and of a uniform brown colour. The entrance to the winding burrow sloped down to about six inches below the surface, traversing about six feet, and ended in a larger cavity, in which the spider was discovered. The animal was very fierce, and showed fight at once. Two or three others were afterwards found, the burrows not extending so far—one measuring eighteen inches long and six inches below the surface, and another three feet long and eighteen inches below the surface.

(To be continued).

FROGS.—Recently, while gathering beans (scarlet runners) from the top of a lath shade-house, I came across several well-fed green bull frogs sleeping, evidently after making a good meal of the small insects which abound up there. One opened its eyes at my appearance, blinked, then slid through the space between the laths, and a splash followed. Wishing to see what the others would do, I prodded one with the end of a bean-pod. It went through a similar performance, diving through the space between the laths into 18 inches of water in a tub sunk in the ground 10 feet below. Although I have observed this several times, I have not seen any miss the water or yet have I seen any injured ones. I have not observed them ascending to the roof of the shade-house, but presume they climb up the bean plants, which are thickly interwoven. Is it not unusual for this type of frog to climb to such a height?—G. M. L. N.

TOURIST MAP OF MOUNT DANDEMONG.—A greatly improved edition of the Mount Dandenong tourist map has just been issued by the Lands Department. Covering a larger area than the previous map, it includes the district from Emerald to Gembrook and as far north as Woori Yallock, or "Woori," as the Railway Department now knows that old-settled district. The tourist tracks along Sassafras, Monbulk, Menzies, and Cockatoo Creeks, &c., are clearly marked. These offer unending delights, and, map in hand, tourists should have no difficulty in finding their way about.

* Pocock, Ann. Mag. Nat. Hist. (6), vol. xv., p. 176, pl. x., figs. 2, 2b. 1895.

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FIELD NATURALISTS' CLUB OF VICTORIA.

THE ordinary monthly meeting of the Club was held at the Royal Society's Hall on Monday evening, 8th March, 1915.

In the absence of the president, Dr. C. S. Sutton, one of the vice-presidents, occupied the chair, and about 90 members and visitors were present.

CORRESPONDENCE.

From Mr. W. S. Bowman, hon. secretary Flinders Statue Committee, intimating that the St. Kilda Foreshore Committee had offered from £700 to £800 towards the erection of the Flinders statue on condition that the site to be chosen shall be one upon the St. Kilda foreshore. As this would entail a departure from the original plan of a national memorial in the city of Melbourne, the Executive Committee did not feel entitled to take such an important step without consulting the whole body of subscribers; a general meeting of subscribers would therefore be held at the Town Hall, Melbourne, on Monday, 15th March, at 4 p.m., to consider the matter.

On the motion of Mr. F. G. A. Barnard, seconded by Mr. A. D. Hardy, F.L.S., Dr. C. S. Sutton, vice-president, was delegated to represent the Club; and on the resolution of Mr. F. Wisewould, seconded by Mr. E. E. Pescott, F.R.H.S., he was directed to urge that the statue be erected somewhere in Melbourne, in a more central position than at St. Kilda.

REPORTS.

A report of the excursion to the Botanic Garden on Saturday, 13th February, was made by the leader, Mr. F. Pitcher. The chief feature of interest noted was the presence of flowers on the Japanese Magnolia, *M. conspicua*, var. *Soulangeri*, whilst the shrub was with leaf. These magnolias usually flower only when in the deciduous state, but, owing to the abnormal season, a departure from the customary habit had taken place. This peculiarity had not been noticed during the thirty years or so the "Tulip-trees" have been under cultivation in the Botanic Gardens. The reservoir was visited during the course of the afternoon, and the scheme by which the Garden was reticulated explained in detail. Mr. F. G. A. Barnard referred to the hospitality accorded by Mr. and Mrs. F. Pitcher to the twenty members constituting the party, and moved a vote of thanks to them for the kindness and consideration displayed.

A report of the excursion to Croydon on Saturday, 27th February, was presented by the leader, Mr. C. French, jun.,

who said that there was a good attendance of members, but, owing to the extremely dry season, objects of interest were extremely scarce. Several species of gall-making coccids (scale-insects) belonging to the genus *Brachycelis* were found, and their remarkable forms examined. Several ordinary forms of scale-insects were seen on eucalyptus saplings, while some bushes of *Helichrysum ferrugineum* were found to be affected with a yellowish-green scale, a species of *Asterleocanium*, probably new. A beetle, *Lagria grandis*, was very common about many of the eucalypts. In some districts this beetle has recently attacked ripe fruit and vegetables, becoming quite a pest. Several eucalyptus saplings almost stripped of their leaves were noted, bearing dozens of the leafy homes of the larvae of Hubner's Case-moth, thus presenting a very peculiar appearance. In a sheltered gully some plants of the Rainbow Fern, *Davallia dubia*, were secured for home cultivation. After a pleasant ramble of about four miles over country which in springtime should yield an abundance of wild-flowers, the station was reached shortly before 6 p.m.

REMARKS ON EXHIBITS.

Mr. P. R. H. St. John, referring to his exhibit of herbarium specimens of *Eucalyptus Smithii*, R. T. B., 1899, said this particular form of eucalypt was little known in Victoria, but was in great demand in New South Wales for oil, its average yield being 1.35 per cent., containing 75 per cent. of eucalyptol. The specimens exhibited were collected near Mallacoota Inlet, February, 1915, by Mr. A. T. Burton, of the Victorian Railways. The tree is known as the Gully Gum, and was found by the late Mr. A. W. Howitt, about 1882.

Mr. O. Rosenhain called attention to his exhibit, consisting of damaged bunches of grapes, mostly Waltham Cross, which had been destroyed by blackbirds in his garden at East St. Kilda, where he has about sixty vines, and could pick ten times as many bunches in a similar condition. He considered the blackbirds the most destructive of all introduced birds. Unlike the starling, the myna, and the sparrow, which take flight at the slightest alarm, the blackbird instantly runs to cover, and is lost to sight, thereby making its destruction a difficult matter. In ten or fifteen minutes it returns and recommences its depredations. He therefore strongly recommended that the blackbird be placed on the list of destructive birds.

Adverting to his exhibit of the molar tooth of whale, *Parasqualodon wilkinsoni*, McCoy, from Crassatella beds, Table Cape, Tasmania, Tertiary (Janjukian), Mr. F. Cudmore said the Parasqualodon belongs to the sub-order Odontoceti, or toothed whales, which is first found in Australia in the Janjukian. *P. wilkinsoni* has been recorded from beds of that age at Waurn Ponds, Torquay, and Cape Otway, in Victoria.

Mr. J. Gabriel drew attention to the fasciation evidenced in his exhibit of a branch of *Tecoma McKenii*. The plant from which the specimen was taken was growing in his garden at Kew, and bore other examples of this abnormal feature. Fasciation is a common malformation in plants, especially in stems, which become enlarged and flattened. It produces the crest-like condition exhibited in the cultivated cockscomb, which is an instance of hereditary fasciation, and is said to be ordinarily caused by gall mites.

Mr. F. Pitcher drew attention to his exhibit of blooms of *Acacia discolor*, Willd., Sunshine Wattle, and *Acacia linearis*, Sims, Narrow-leaved Acacia, now flowering in the Botanic Garden, and also to the fruiting branches of the Victorian Muttonwood, *Myrsine variabilis*, R. Brown, and to a photograph depicting the February flowering of the Japanese Magnolia, *Magnolia conspicua*, var. *Soulangeri*.

Mr. J. Searle drew attention to several species of thrips exhibited on behalf of Mr. R. Kelly. Thrips are extremely small insects, which can do an immense amount of damage to plant life, and this season have been particularly destructive, especially to orchard crops. Thrips are classed by themselves in the order Thysanoptera, so named on account of their fringed wings. Their feet are peculiar, on account of being bladder shaped. One remarkable Australian genus forms galls on acacia leaves, while another (Idolothrips) is quite a giant in the group, being a quarter of an inch in length.

He also called attention to a tube of pond water showing a remarkable development of a species of *Vorticella*, one of the Bell-animalcules. A colony of these attached to a twig had been placed in a tube 4 inches x $\frac{3}{4}$ -inch, three-parts filled with water, and in forty-eight hours had increased to such an extent that the whole of the tube was lined with new colonies of *Vorticella*.

LECTURE.

Mr. E. O. Thiele, D.Sc., then delivered an illustrated lecture on "Geological Exploration in Portuguese East Africa."

The lecturer, who for many years was a member of the Club, for the last seven years has been conducting geological exploration in tropical Africa, under the direction of the Imperial Institute, London. For two seasons he was associated with Mr. A. E. Kitson in Southern Nigeria, who, it will be remembered, gave an interesting account of his work before the Club some eighteen months ago (*Vict. Nat.*, vol. xxx., p. 37, June, 1913). During the past four years he has had charge of similar work in Portuguese East Africa, where he has had as an assistant Mr. R. C. Wilson, also a Victorian.

The lecture was illustrated by a splendid series of lantern slides, those of the physical features being especially fine.

Mr. A. D. Hardy, F.L.S., in moving a hearty vote of thanks to the lecturer, said the series of views he had displayed were perhaps the most interesting ever shown at a Club meeting, and all present had listened to his remarks, with their infinite wealth of detail, with the closest attention. The excellence of the photography, and the physical effort Mr. Thiele must have undergone to obtain many of the views, appealed to all. The motion was seconded by Mr. F. Wisewould, and carried by acclamation.

EXHIBITS.

By Mr. F. Chapman, F.L.S.—Leaves of Sugar Gum, *Eucalyptus cladocalyx*, F. v. M., showing helicoid growth.

By Mr. F. Cudmore.—Molar tooth of whale, *Parasqualodon wilkinsoni*, M'Coy, from Crassatella beds, Table Cape, Tasmania, Tertiary (Janjukian).

By Mr. J. Gabriel.—Branch of *Tecoma McKenii*, from exhibitor's garden, Kew, showing fasciation.

By Mr. R. Kelly.—Various species of thrips.

By Mr. F. Pitcher.—Flowering specimens of the Narrow-leaved Acacia, *Acacia linearis*, Sims, and the Sunshine Wattle, *Acacia discolor*, Willd., from Botanic Garden; also fruiting branches of the Victorian Smooth Beech, *Myrsine variabilis*, R. Brown, and a photograph depicting the February flowering of the Japanese Magnolia, *Magnolia conspicua*, var. *Soulangeri*.

By Mr. E. E. Pescott, F.R.H.S.—Portion of tomato plant, *Solanum lycopersicum*, Linn., showing bud and growth development at each node of the leaflets; pinnate leaf of Honey Locust Tree, *Gleditschia triacanthos*, L., showing three pinnate leaflets (the tree naturally possesses pinnate leaves only).

By Mr. O. Rosenhain.—Bunches of grapes destroyed by blackbirds, from exhibitor's garden, East St. Kilda.

By Mr. J. Searle.—Vorticella, sp., also several species of thrips collected by Mr. Reginald Kelly.

By Mr. P. R. H. St. John.—Herbarium specimens of *Eucalyptus Smithii*, R. T. B., Gully Gum, collected near Mallacoota Inlet, February, 1915, by Mr. A. T. Burton.

After the usual conversazione the meeting terminated.

PORtUGUESE EAST AFRICA.

THE following is a brief résumé of a very interesting and instructive illustrated lecture given by Mr. E. O. Thiele, D.Sc., at the March meeting of the Field Naturalists' Club of Victoria.

The lecturer said that during the past four years he had been engaged in geological investigations in that part of Portuguese East Africa between the Zambesi and Sabi Rivers, an area of about 67,000 square miles.

The conditions of work and travel, being off the beaten track of ordinary travellers, are very different from those of bush-life in Australia, so that there is much of interest to relate with regard to the experiences incidental to the organizing and carrying out of exploration in these parts. Everything has to be carried on the heads of natives, for, after leaving the railway line which leads from Beira to Rhodesia, there are no roads for wheeled vehicles, and the presence of belts of country infested with tsetse fly prevents the use of horses or oxen for extended trekking.

The party numbered only two white men ; but, as a supply of food and equipment for at least six months had to be taken, and frequently large supplies of food carried also for the porters, the number of natives in the caravan sometimes amounted to as many as 150. There are many disadvantages attached to having such a large retinue. Transport and food problems and other accompanying worries occupy much attention and thought ; but, on the other hand, there is a great advantage in having a large supply of labour for track and line clearing, the sinking of test holes, the carrying of tools and instruments, and other work associated with exploration in rough or bush-covered country.

The foreign language and customs have to be reckoned with by travellers new to these parts. Many of the Portuguese officials speak English, but in the back country the intercourse with white persons is very occasional. The knowledge of a native language is, however, of more importance and help. The principal native languages are Sena and Shangan ; but, as most of the natives have been across the frontier into Rhodesia or the Transvaal, to work in the mines, they generally understand Kaffir, which is easy to pick up, and this is, in fact, almost a necessary attainment for the white traveller. It is impossible to do entirely without an interpreter, but, even at the best, this method of conversing is slow, and frequently trying and unsatisfactory.

The climate shows a wide range—from the hot coastal lowlands to the cooler uplands and frontier heights, where the altitude rises to over 6,000 feet in places. Malaria is present, as it is in most parts of tropical Africa, but nevertheless many districts are tolerably healthy, and during the dry season, for at least six months, the climate is often very agreeable, especially in the highlands.

The greater part of the country is covered with forest, which is very dense in some of the moister parts, but in general is of an open character. Rank grass, from 10 to 12 feet high—the growth of a few months after the rains—is a striking feature, and is often a great hindrance to exploration.

The country, on the whole, is well watered by numerous

permanent streams. Many parts are fertile, and should be productive in the future when suitable communication is established. The district adjoining the railway line is developing rapidly as a maize-producer.

A certain amount of gold-mining has been carried on for some years in the Manico district, near Rhodesia. The most productive mining undertaking at present is a gold-dredging proposition in the Revue Valley.

Game is plentiful and of great variety in some districts, especially on the Gorongoza Plains, where countless mobs of animals can be seen. These are the favourite hunting-ground of numerous lions.

The journeys of the Survey each season amounted to distances varying from 1,500 to 2,000 miles, and, as the scenery is diversified and often grand and rugged along the frontier, a fine collection of views had been obtained. For the present lecture these were selected and arranged systematically into instructive groups as follows:—

1. Scenes and incidents of travel and camp life.
2. Vegetation.
3. Physiographic studies.
4. Studies of native life and customs.

With regard to the physiographic section, the region provides some interesting and striking illustrations of the intimate relation of scenery and surface features generally to geological structures and processes. It is a region of diversified features, ranging from extensive lowland plains to mountainous blocks rising to more than 6,000 feet above sea-level. It lies in an interesting but very imperfectly known portion of the important tectonic zone of Eastern Africa. Its surface features show a marked relation to important lines of fracture and dislocation. The most important are those having a north and south trend. They are best developed along the eastern edge of the great plateau of Southern Rhodesia. They coincide closely with the frontier, forming a zone of striking scarps and fault-blocks. Faulting, parallel to this line, but further east, has resulted in the dislocation of an ancient pene-plain forming a large shelf or step from 1,000 to 2,000 feet above sea-level, exhibiting interesting examples of differential movement, residual ridges and blocks, inselberg types of scenery, and general rejuvenation of the river systems.

The torrential character of the rain in the wet season, following a long dry one, renders general erosional forces very active; but, powerful as they are, it would appear that the major features of the region are dominated by important tectonic and structural factors. A more extended description and discussion of these features, by Messrs. Thiele and Wilson, is to be found in the *Geographical Journal*, January, 1915.

A NATURALIST IN NORTHERN QUEENSLAND.
By J. A. KERSHAW, F.E.S., Curator of the National Museum,
Melbourne.

(Read before the Field Naturalists' Club of Victoria, 9th Nov., 1914.)
(Continued from page 172.)

On the 6th January the weather cleared sufficiently to enable us to remove to a camp a few miles down the river, our object being to work the extensive mangrove and tea-tree swamps.

The country here consisted of fairly open forest, the lower-lying parts forming great swamps, in which grew thick forests of the Paper-bark Tea-tree, *Melaleuca leucodendron*. Bordering the river for many miles are the mangrove swamps, consisting chiefly of the white mangrove. This species grows to a height of 30 or 40 feet, the rather slender and perfectly straight stems being branched only at their tops, and bearing a large, round, orange-like fruit about four inches in diameter. These swamp areas are inundated with each rise of the tide, and more or less drained again as the tide recedes, leaving the surface covered with a thick, sticky mud, through which protrude the short, pliable pneumatophores or breathing tubes of the mangrove. As we splashed our way through water and mud among the closely-growing trees, the inrushing tide raising the water knee-deep, numbers of large mangrove crabs dropped off the tree-trunks and scrambled into their holes in the slimy mud, while in the more open spaces butterflies of various kinds, including the brilliantly-coloured Mangrove Blue, *Arhopala amyris*, flitted to and fro. Several species of birds were noted, chief among them being the gorgeously-plumed White-tailed, Yellow-billed, and Mangrove Kingfishers, which frequent these localities, the latter never being found far from their vicinity. Just outside the mangroves, and among a densely-tangled scrub, were some of the finest examples of the Fan Palm yet met with. These were growing in a great mass in swampy ground too difficult to penetrate, and varied in height from 3 to 30 feet. Several species of moths, including *Euchromia irius* and *Tigridoptera mariana*, and some unknown species, were taken among the darkened mangroves, but the rising tide and myriads of mosquitos did not permit us to delay.

Bordering the edges of these swamps we occasionally came on broad, deep water-holes margined with almost impenetrable scrub, palms, and ferns, in which we disturbed several crocodiles, which, suddenly startled, splashed into the water, leaving a long trail to mark their progress. Along the banks of such holes and near the river these reptiles build up their nest-mounds, in which they deposit their eggs. While wading through the swamps care had to be exercised to avoid these

reptiles, as they were now breeding, and were more than usually venturesome. Later on, while rowing down the river, our blacks pointed out one of these nesting-mounds, situated close to the edge of the river. The freshly-scraped earth all around showed that it had just been covered, and on opening it up we found 43 fresh eggs, deposited in a mass about a foot below the surface. The mound consisted of a dome-shaped mass of sand, leaves, sticks, and other débris, scraped together from a space of some 10 feet all round, and measured 4 feet in diameter and 3 feet high. Some of the eggs were taken for blowing, and the remainder given to our blackboys, who immediately cooked them.

Leaving the mangroves and traversing the open forest for some distance, we reached one of the extensive, shallow, tea-tree swamps, margined in places with thick growths of ferns—*Aspidium cordifolium*—which grew to a height of about 3 feet, and spread over an area of several chains wide, with here and there fine examples of Screw Palms. Growing in the water was a forest of Paper-bark trees, *Mcleaseuca leucodendron*, whose tall, straight, white trunks stood out prominently against the dark waters of the swamp, in which they were beautifully reflected. Dozens of dragon-flies darted swiftly to and fro among the tree-trunks, the bright sunlight, gleaming through the foliage, catching their gauzy wings, and making them to appear like small birds. Here and there were great Fan Palms, forming small plantations in the deeper parts of the swamp, among which we more than once disturbed a crocodile. The blacks warned us of "plenty alligator" in these swamps, and we kept a sharp look-out for any sign of them while wading through water, usually up to our knees, but often to our waists. The bottom was thick mud, and we had great difficulty in keeping on our feet owing to the great quantity of submerged trees and branches. The water was quite warm, and at times almost hot, while at every step evil-smelling gases arose from the surface from the masses of decaying vegetable matter beneath. In these swamps we took several nests of the Brown-backed Honey-eater, *Glyciphila modesta*, loosely-built structures of strips of bark, and lined with soft flakes of the same material (three of which contained the egg of the Brush-Cuckoo), and the Buff-breasted Fly-eater, *Gerygone lavigaster*; the nest of the latter was also built of fine strips of bark, interwoven among the leaves of the tea-tree, and lined with finer bark material and a few feathers. On the edge of the swamp was obtained a White-browed Water-Crake, *Poliolimnas leucophrys*, and the White-quilled Pigmy-Goose, *Nettapus albipennis*.

In the open forest several nests of Cockerell's Honey-eater

were found. These birds, which have a beautiful musical note, build a very neat, open, cup-shaped nest of very fine grass, with at times fine tendrils, usually placed in a small shrub three or four feet from the ground. Others, such as the Shining Flycatcher, *Piezorhynchus nitidus*, Boat-billed Flycatcher, *Machærirhynchus flaviventer*, Northern Fantail, *Rhipidura isura*, Yellow Oriole, *Oriolus flavicinctus*, Lovely Wren, *Malurus amabilis*, &c., were also taken, while in the open country, on the opposite side of the river, was secured the rare Blue-cheeked Parrot, *Platycercus amathusiae*.

Close to our camp was discovered an old and deserted bower of the Fawn-breasted Bower-bird, *Chlamydera cerviniventris*, and on the following day a fresh one was found, built in the shelter of some thick scrub. The sides of the bower were formed of small twigs, closely and securely packed, about 15 inches long and 12 inches high, separated at the top, the base, of similar material, extending at either end a little distance from the upright sides. Both entrances were decorated with numbers of brightly-coloured berries about half an inch long, some bright green, others dark blue, while others were placed here and there among the tops of the upright twigs forming the sides of the bower. A couple of feet from either entrance was a small heap of the faded and discarded berries. This bower was carefully removed intact, and is now in the National Museum. The measurements of the old bower were:—Length of walls, 15 inches; height, 12 inches; space separating upright walls, 3 inches; thickness of material forming walls—on one side 6 inches, on the other not more than 3 inches. The platform approach extended at one end 15 inches, at the other 4 inches. The whole structure was so compactly and firmly constructed that, although an old one, and saturated with the recent rains, it could be lifted bodily by the upright walls without injury.

Later on we dug out several burrows of the Elephant Beetle, *Xylotrupes*, numbers of which we found in the vicinity of our camp in the loose, sandy soil. These burrows were easily recognized by the large heap of soil piled up outside the entrance, which measured about two inches in diameter. Many of the burrows opened up were over 18 inches deep, winding somewhat as they went down and ending in a small rounded chamber filled with a good handful of gum-leaves, among which the female deposits her eggs. In several of these chambers we found a single female, and in one three small whitish eggs of a long oval shape, deposited among the vegetable débris. Apparently the burrow is excavated by the female only, as no males were found. The eggs are hatched by the moist heat of the decaying vegetable material, upon which,

as well as the roots of the adjacent trees, the larvae apparently feed. Another burrowing insect found here was a large cricket, which makes a small round burrow in the open spaces about half an inch in diameter and 15 inches deep. Around the entrance was usually scattered a small quantity of fine sand. Some of these burrows were noticed within our tent, and during the evenings the insects frequently emerged.

One of the most interesting sights witnessed during our trip was the occurrence of the fire-flies, small, black beetles about a quarter of an inch long, belonging to the family Lampyridæ—*Luciola* (? sp.) These first appeared on the 14th January, and were seen almost every night until we left at the end of the month. It was a wonderful sight to witness the flight of these small creatures, which appeared as intensely bright floating lights, moving gently to and fro around the tree-tops or from tree to tree, and occasionally descending to the ground. Two or three tall eucalypts near our camp seemed to have a special attraction for them, and in the darkness of the night the dozens of tiny lights floating about their topmost branches presented quite a remarkable spectacle, which could be seen from a considerable distance. Many flew round and even into our tents, where they could be seen drifting to and fro after our lights were extinguished. The light, which is apparently a means of attracting the sexes to each other, is produced from a small whitish patch on the under side of the abdomen. In what is presumed to be the male, this patch is situated on the penultimate segment, while in the female it is larger and extends over the second and third last segments. It has been suggested that the light is produced by the slow oxidation or combustion of a substance supposed to be phosphuretted hydrogen which is formed under the influence of the nervous system, and that the seat of the light is the parenchymatous cells of the superficial layer of the light organs. The light given forth from these abdominal patches is so bright and intense that it produces quite a radiance around the object on which it settles. It pulsates in and out at short intervals, and the insects have the power of extinguishing it at will, but only for very short intervals. The alternate emission and cessation of the phosphorescence is clearly seen as the insects float through the air, and particularly while holding them in the hand. That produced by some placed alive in a small glass tube in the pocket of a white coat could be detected through the material. When left undisturbed it became dull, but directly the tube was shaken it became very brilliant, and even when held near the light of a lamp could be clearly seen. A somewhat similar light was noticed on the ground, which, on investigation, proved to be produced by a small worm-like

semi-transparent larva, about half an inch long. The head was furnished with a phosphorescent light, similar to but not so large and bright as that of the beetle, while it was much brighter than that emitted by glow-worms noticed a few weeks earlier in the same locality. Could these be the larvæ of the beetle?

After spending several days among the swamps, we again moved our camp up the river. The heavy rains still continued, and their effect on the growth of the coarse grass was wonderful. In places where we had previously found it easy walking the grass was now three and four feet high, and we were rarely dry. Shrubs and creepers were now coming into flower, some of the latter having a strong, sweet scent. March-flies and mosquitos had increased to such an extent that we were often compelled to light smoke fires in the scrub in order to get a little relief, while similar fires had to be kept going regularly around and inside our tents. The ordinary domestic fly, which had been practically absent, now made its appearance in increasing numbers every day, and a small blow-fly, which dropped its living larvæ over everything, frequented the camp in numbers. Leeches and the scrub-itch were, however, absent. Insects were now becoming more plentiful, and many interesting species were taken. Cicadas were numerous, five or six species occurring, chiefly in the open country, while among the butterflies were *Papilio polydorus*, *Rhinopalpa sabina*, *Diadema alimena*, *Massaras prosope*, *Mycalesis terminus*, and several species of skippers. Several rare moths, some quite new to me, were also captured.

Many of the birds were also nesting more freely. In the scrub the small, open, cup-shaped nests of the White-bellied Flycatcher, *Monarcha albiventer*, were found, containing two eggs. They were composed of small strips of bark and fine tendrils, bound together with spiders' web, and lined with hair-like fibre and rootlets. In a deep recess between the buttressed roots of a large fig-tree was discovered the nest of the Lesser Pitta, *P. simillima*, containing three eggs. It was a loosely-built, dome-shaped structure, placed on the ground, and built of leaves, small sticks, and fibres, with the entrance at the side. Another nest was found in a similar situation, but about 8 feet from the ground. The nests of the Blue-breasted Pitta, *P. mackloti*, were also found. Two of these were built on the ground in a similar situation to those of *P. simillima*; another was found among the branches of a recently fallen tree. The White-tailed Kingfisher, *Tanysiptera sylvia*, and the Yellow-billed Kingfisher, *Syma flavirostris*, both breed in termites' mounds, in the side of which they excavate a small tunnel. They occupy these mounds whether situated on the

ground or high up in the trees, one of the latter species being found about 30 feet from the ground. Nests of the Rufous-breasted Thrush, *Colluricincla rufigaster*, and the Grass-Warbler, *Cisticola exilis*, were also taken.

To give anything like a full account of our varied experiences in this extremely interesting country would occupy much more space than can be spared. A large number of photographs, many of particular interest, were taken during our visit, but, notwithstanding every possible care taken, most of these were more or less ruined by mildew during the wet season.

We remained here until the 30th January, when, according to arrangement, our boat arrived and took us, with our baggage, down the river, and thence to Lloyd Island. We left the island on the 1st February on our 80-mile journey in a lugger to the Claremont Islands, where we again boarded the s.s. *Suva*, bound for Brisbane. This ended one of the roughest but certainly one of the most interesting of trips it has been my lot to experience, and I was never more sorry than when I bid goodbye to our friends, Messrs. W. M'Lennan and A. Mohr, who had done so much to make our visit an enjoyable and profitable one, and turned my back on the *Claudie*.

To Mr. M'Lennan I am greatly indebted for his continued interest and help in my work. Without his assistance and experience it would have been impossible to have explored so extensively the dense scrubs, and it was due to his energy and enthusiasm that I was able to add many of the rarer specimens to my collection, while to Dr. Macgillivray, who arranged the trip, I owe the opportunity of visiting so remote a part of Northern Queensland, and I am glad to give expression to my heartiest thanks for the cordial and ever-ready assistance accorded me by himself and his son Ian throughout the trip.

[The paper was illustrated by a large series of lantern slides.—ED. VICT. NAT.]

“THE MEMOIRS OF THE NATIONAL MUSEUM, MELBOURNE.” No. 5 (July, 1914).—Owing to want of space, notice of this publication has been held over for some time. The number contains an important article by Mr. F. Chapman, A.L.S., F.R.M.S., Palaeontologist to the Museum, entitled, “On the Succession and Homotaxial Relationships of the Australian Cainozoic System.” The author has dealt so fully with his subject that, aided by the figures and references, the article might almost be used as a guide to the fossiliferous localities of southern Victoria, and students of Cainozoic fossils will be deeply indebted to the author for clearing up so concisely the certain amount of confusion which has resulted from the determinations of various authorities.

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